

**MENTAL FATIGUE OF FAMILY CAREGIVERS OF CANCER
PATIENTS PARTICIPATING IN PHASE I CLINICAL TRIALS**

by

Denise M. Weiss

**A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Nursing)
in the University of Michigan
2014**

Doctoral Committee:

Professor Laurel L. Northouse, Chair

Professor Sonia A. Duffy

Professor Berit Ingersoll-Dayton

Associate Professor Maria C. Katapodi

© 2014 Denise M. Weiss

DEDICATION

This dissertation is dedicated to all caregivers.

ACKNOWLEDGEMENTS

One of my lessons during this dissertation trajectory was that you do not do it alone. I would like to thank the many people who have supported me during the PhD program.

I would like to start by expressing my sincere gratitude to the dissertation committee. I want to thank Dr. Northouse for her support and guidance throughout my entire PhD experience. I would like to thank Dr. Duffy and Dr. Katapodi for their scholarly support in oncology nursing science. I would like to thank Dr. Ingersoll-Dayton for her direction and encouragement. It has been a privilege to work with each of these committee members.

My sincere gratitude extends to my husband Ron, my mother Reva, my sister Margaret and my brother Charles for their love and support to have made this all possible. I would like to thank my friends Penny Riley, Moira Kirvan Visovatti, Gail Newth, Mary Jo Pilat, and the faculty at University of Detroit-Mercy.

This study could not have been done without the support and assistance from Dr. LoRusso and the Eisenberg Center of Experimental Therapeutics. Finally, I am most grateful for the men and women who volunteered to participate in this study.

TABLE OF CONTENTS

DEDICATION	ii
ACKNOWLEDGEMENT	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
ABSTRACT	viii
CHAPTER	
I. Introduction	1
Specific Aims	3
References	6
II. Mental Fatigue and Quality of Life in Family Caregivers of Cancer Patients	8
Specific Aims	10
Theoretical Framework	11
Review of the Literature	12
Conclusion	19
References	23
III. Qualitative Analysis of the Experience of Mental Fatigue in Family Caregivers of Cancer Patients on Phase I Trials	33
Theoretical Framework	35
Review of the Literature	36
Methods	38
Results	40
Discussion	46
References	56

IV.	Factors Associated with Mental Fatigue in Family Caregivers of Oncology Patients on Phase I Clinical Trials	60
	Theoretical Framework	62
	Methods	65
	Measures	66
	Results	69
	Discussion	70
	References	84
V.	Summary of the Three Papers	90
	References	95

List of Tables

Table		
3-1	Demographic Data	54
3-2	Qualitative Themes	55
4-1	Demographic Data	80
4-2	Instruments	81
4-3	Correlation Table	82
4-4	Descriptive Data on Mental Fatigue	83

List of Figures

Figure		
2-1	Family Systems Model	21
2-2	Stress and Coping Theoretical Model	22
3-1	Family Systems Model	52
3-2	Qualitative Questions	53
4-1	Family Systems Model	77
4-2	Stress and Coping Theoretical Model	78
4-3	Model with Standardized Regression Weights	79

Abstract

Purpose: Despite the high prevalence of metastatic cancer, little information is available on family caregivers' attentional capacity and fatigue. The purpose of this dissertation project was to: a) review the literature on mental fatigue of family caregivers of advanced cancer patients; b) describe caregivers' experience of mental fatigue based on qualitative data; and c) examine caregivers' level of mental fatigue quantitatively and identify factors associated with higher mental fatigue in caregivers of cancer patients participating in Phase I clinical trials.

Methods: Data were collected from family caregivers of cancer patients participating in Phase I clinical trials at a large, metropolitan, National Cancer Institute-designated comprehensive cancer center in the Midwest (N=79). Qualitative data were obtained using an open-ended questionnaire that asked caregivers to describe their perceptions of mental fatigue. Descriptive statistics were used to quantify caregivers' level of mental fatigue using an established instrument. Path analysis was used to test a model based on stress-coping theory that was designed to explain the direct and indirect effects of age, social support, caregiver burden, and coping on caregivers' mental fatigue.

Results: The review of existing literature indicated that few studies have examined mental fatigue in caregivers of cancer patients, even though the demands of care are high

and therefore often resulting in caregiver burden. Qualitative analysis indicated that caregivers' mental fatigue is often manifested by symptoms such as irritability and forgetfulness. Although caregivers experienced mental fatigue, most caregivers reported that they were able to provide optimum quality of care. However, findings indicated that caregivers often neglected their own health in order to provide optimal care to the patient. Quantitative analyses indicate that caregivers reported higher mental fatigue than the normal population. Path analysis showed that social support had significant direct and indirect effects on mental fatigue, avoidant coping had a direct effect, and age and burden had indirect effects on mental fatigue. The overall model explained 18% of the variance in caregivers' mental fatigue and provided support for the Family Systems Theory and Stress-Coping Model.

Conclusion: Family Systems Theory and Stress-Coping Model were supported as useful ways to conceptualize research and organize clinical practice to help family caregivers with mental fatigue. Based on the research findings, clinicians must help caregivers mobilize supportive resources and use effective coping strategies to manage caregiver burden and reduce mental fatigue. Clinicians should tailor intervention strategies for younger caregivers who are at particular risk of developing mental fatigue. Future research needs to focus on development of interventions that will provide caregivers of patients on Phase I trials with more social support and coping resources to prevent long-term sequela.

CHAPTER I

Introduction

Approximately 14 million Americans are living with a diagnosis of cancer (American Cancer Society, 2013). Cancer and cancer treatment not only affects the health and function of patients, but also the well-being of their family members (Kurtz, Kurtz, Given, & Given, 2004). To date, few studies have examined cognitive or attentional function in caregivers and even fewer have studied cognitive function in family caregivers of cancer patients. Cognitive processes altered under stress include attention, working memory, and long-term memory (Mendl, 1999). This dissertation study will begin to address altered attention-mental fatigue in family caregivers of cancer patients

The dissertation paper consists of five chapters: Introduction (Chapter 1), Theoretical framework and review of literature (Chapter 2), Qualitative study on caregiver mental fatigue (Chapter 3), Quantitative study of caregivers' mental fatigue and model testing of factors associated with mental fatigue using path analysis (Chapter 4), and Conclusion (Chapter 5). The introduction chapter will include: a brief review of the cognitive impairment-mental fatigue, purpose of the dissertation, specific aims, and significance for nursing and health care.

Cognitive Function in Caregivers

Cognitive function in caregivers of cancer patients has received little attention. The few studies that have assessed cognitive function in caregivers have been with patients with Alzheimer's disease (Caswell et al., 2003; Vitaliano et al., 2005, Vitaliano et al., 2009), patients in palliative care (Mackenzie, Smith, Hasher, Lewach, & Behl, 2007), and caregivers of elderly persons (Lee, Kawachi, & Grodstein, 2004). Together these studies suggest that cognitive impairment may be an important symptom experienced by caregivers.

The cognitive function of attention is an understudied yet important domain for caregivers. Directed attention is important because it supports short-term memory, helps with learning and problem-solving, and is required for formulating goals, planning, and decision making (Smith & Jonides, 1999), all of which are required of caregivers. Attention involves increased sensitivity to important information in the environment. However in order to focus on this important information, it is necessary to exclude less important information. This requires mental effort as well as selectivity, concentration, sustaining focus, and goal directed effort (Posner & Snyder, 1975). Directed attention is the capacity to block or inhibit competing stimuli and distractions during purposeful, goal-directed activity (Kaplan & Kaplan, 1982). The mental energy required for directed attention is a limited resource (Kaplan, 1995) due to the inability to sustain directed attention indefinitely. When the neural inhibitory process becomes fatigued people can succumb to distractions and have greater difficulty concentrating. This mental fatigue may impair caregivers as they work on learning new information, adhere to a treatment plan, or try to carry out daily tasks.

Purpose

Mental fatigue has not been identified in the oncology family caregiver, although its occurrence could have a significant impact on the caregiver and care recipient. Inquiring about and determining the presence of mental fatigue, along with identifying factors associated with it, is of paramount importance as the caregiving population continues to grow. Providing caregivers with information in order to help them identify sequela that may manifest from caregiving may help in reducing their demands. Therefore the purpose of this dissertation is to: 1) present a theoretical framework to guide this study and review the literature on mental fatigue and quality of life and factors related to them in family caregivers of cancer patients, 2) describe the experience of mental fatigue based on qualitative data obtained, and 3) examine mental fatigue in caregivers quantitatively and identify factors associated with their mental fatigue using path analysis.

Specific Aims

- I. The specific aims for manuscript one, *Mental Fatigue of and Quality of Life of Family Caregivers of Cancer Patients*:

Aim 1: To describe the quality of life and mental fatigue of family caregivers of advanced cancer patients on Phase I trials.

Aim 2: To use the stress coping theory of Lazarus and Folkman (1984) and Family Systems Theory to guide the review of literature pertaining to factors associated with quality of life and mental fatigue.

II The specific aims for manuscript two, *Qualitative Analysis of the Experience of Mental Fatigue in Family Caregivers of Cancer Patients on Phase I Trial*, are:

Aim I: To obtain qualitative data on caregivers' experience of mental fatigue.

Aim II: To examine the extent to which caregivers perceive mental fatigue to interfere with their caregiving.

Aim III: To identify strategies caregivers use to manage mental fatigue

Aim IV: To ascertain the kind of help caregivers would like from health professionals.

III. The third manuscript, *Factors Associated with Mental Fatigue in Family Caregivers of Oncology Patients on Phase I Trials*, will address the following aims:

Aim 1: To examine mental fatigue in caregivers of cancer patients participating in Phase I clinical trials.

Aim 2: To identify factors associated with mental fatigue using path analysis.

Significance for Nursing and Health Care

This dissertation examined mental fatigue in caregivers of cancer patients. Since this concept has not been studied in the cancer area, both qualitative and quantitative information about mental fatigue was obtained.

In view of the rising cost of health care and the decrease in oncology care providers, family caregivers will be expected to take on more of the complex care in the home that was previously provided by nurses and other health professionals. Historically, family caregivers report that they place their own needs second to that of the patient. But as the burdens of caregiving increase greater attention needs to be directed to the stressful effects of this role on

caregivers and their ability to direct attention to meet patients' needs without compromising their own health.

This dissertation focuses on the mental fatigue of family caregivers of cancer patients participating in Phase I clinical trials. Each of the three papers presented as part of this dissertation highlights aspects of mental fatigue and addresses ways that health care providers can assist caregivers to maintain their important role, without comprising their own attentional capacity and health. By identifying factors associated with mental fatigue, health professionals will be able to identify caregivers at higher risk for mental fatigue and use this information to educate the families about the effects of mental fatigue.

References

- American Cancer Society. (2013). *Cancer Facts and Figures 2013*. Retrieved from http://www.cancer.org/acs/groups/content/@epidemiology_surveillance/documents/document/acspc-036845.pdf
- Caswell, L. W., Vitaliano, P. P., Croyle, K. L., Scanlan, J. M., Zhang, J., & Daruwala, A. (2003). Negative associations of chronic stress and cognitive performance in older adult spouse caregivers. *Experimental Aging Research*, 29, 303-318.
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, 15, 169-182.
- Kaplan, S., & Kaplan, R. (1982). *Cognition and environment: Functioning in an uncertain world*. New York, NY: Praeger.
- Kurtz, M. E., Kurtz, J. C., Given, C. W., & Given, B. A. (2004). Depression and physical health among family caregivers of geriatric patients with cancer-a longitudinal view. *Med Sci Monit*, 10(8), CR447-456.
- Lee, S., Kawachi, I., & Grodstein, F. (2004). Does caregiving stress affect cognitive function in older women? *The Journal of Nervous and Mental Disease*, 192(1), 51-57.
- Mackenzie, C. S., Smith, M. C., Hasher, L., Leach, L., & Behl, P. (2007). Cognitive functioning under stress: Evidence from informal caregivers of palliative patients. *Journal of Palliative Medicine*, 10(3), 749-758.
- Mendl, M. (1999). Performing under pressure: Stress and cognitive function. *Applied Animal Behaviour Sci*, 65(3), 221-244.

- Posner, M. I., & Snyder, C. R. (1975). Attention and cognitive control. In R. L. Solso (Ed.), *Information processing and cognition* (pp. 55-85). Hillsdale, NJ: Erlbaum.
- Smith, E. E., & Jonides, J. (1999). Storage and executive processes in the frontal lobes. *Science*, 283(5408), 1657-1661.
- Vitaliano, P. P., Zhang, J., Young, H. M., Caswell, L. W., Scanlan, J. M., & Echeverria, D. (2009). Depressed mood mediates decline in cognitive processing speed in caregivers. *The Gerontologist*, 49(1), 12-22.
- Vitaliano, P. P., Echeverria, D., Yi, J., Phillips, P. E., Young, H., & Siegler, I. C. (2005). Psychophysiological mediators of caregiver stress and differential cognitive decline. *Psychology and Aging*, 20(3), 402-411.

Chapter II

Mental Fatigue and Quality of Life in Family Caregivers of Cancer Patients

Introduction

Cancer is the second leading cause of death in the United States. The 5-year survival rate for all cancers diagnosed between 1999 and 2005 is 68%. This figure represents an improvement of 50% from 1975-1977 (American Cancer Society, 2010). In spite of these promising improvements, there are still a large number of cancer patients whose disease is not responsive to conventional therapies or who develop resistance. Many of these patients will be placed on Phase I trials that test the newest drug therapies to verify the tolerability of the treatments and determine an appropriate dose for large-scale clinical trials which are designed to assess efficacy. Patient benefit is not the intent of Phase I studies, and they are typically offered to patients who are refractory to standard therapies and have few, if any, remaining treatment options (LoRusso, Boerner, & Seymour, 2010). These cancer patients, for the most part, enter Phase I clinical trials heavily pretreated from standard therapies, have exhausted conventional treatment, and enroll into research studies as a means of maintaining hope in spite of despair. Although Phase I studies are not specifically designed to assess efficacy, a meta-analysis found the overall response rate of 4.4% for patients participating in Phase I clinical trials using single agent cytotoxics (Horstmann et al., 2005).

Family members play a key role in patient's decision to participate in Phase I trials (Kohara & Inoue, 2010). Caregivers of cancer patients are faced with a myriad of intense demands, such as symptom management, medication administration, communication with health professionals, and financial and household management. Family caregivers must face multiple demands placed on them including the provisions of emotional, spiritual, and physical support to the patient (Kurtz, Kurtz, Given, & Given, 2004; Sherwood, Given, Given, & von Eye, 2005; Swore, Fletcher, Dodd, Schumacher, & Miaskowski, 2008) while also trying to deal with their own emotional distress. Taking on the role of family caregiver can create stress and strain in caregivers and can have a negative impact on their own health (Schulz & Beach, 1999). Research indicates that caregivers of cancer patients suffer caregiver burden, anxiety, frustration, and depression (Given, et al., 2004; Jensen & Given, 1991; Kurtz et al.).

Providing proper care to an oncology patient requires a great deal of focus, concentration, and directed attention (Kurtz et al. 2004). This is especially the case when the patient suffers from advanced disease and the multiple demands on the caregiver are higher than during other phases of illness (Northouse et al., 2002). In order to focus and sustain attention, a person needs to be able to resist distraction and redirect mental effort to the task at hand (Kaplan, 1995). However, mental effort, or energy, involved in the inhibition of competing stimuli is susceptible to fatigue. Mental fatigue, also called attentional fatigue, occurs when there is an excessive use of the neural inhibitory process to inhibit distractions in order to maintain focus on the demands of the present task (Kaplan & Kaplan, 1989; Posner & Snyder, 1975). The inability to direct attention leads to reduced effectiveness in cognitive functioning and discomfort (Kaplan). Research indicates that caregivers can have difficulty maintaining their focus because of the

perceived distress from assuming the role of caregiver (Sherwood, Given, Given, & von Eye, 2005). Attentional fatigue can occur when caregivers are less able to block distractions from interfering with caregiving, which then adversely affects their ability to perform demanding tasks (Cimprich, 1995; Kaplan & Kaplan 1982). Mental fatigue can impair the caregiver's mental processes such as problem-solving, planning, execution of plans, decision-making, and social interactions. Therefore the inability to direct attention may undermine the caregiver-care recipient relationship and caregivers' ability to provide optimal care.

A particular subgroup of caregivers who may be at risk for more distress, lower quality of life, and mental fatigue are family caregivers of patients enrolled in Phase I trials. Since the National Cancer Institute (2011) has made new drug development a national priority there will be an increase in the number of Phase I trials for cancer patients. As a result more caregivers will be placed in the demanding role of providing physical and emotional care to these seriously ill patients who perceive Phase I trials as their last chance to arrest the cancer. In addition to studying the effect of new therapies in Phase I trials on patients, more research is needed in the issues of quality of life and mental fatigue of family caregivers who will be caring for these seriously ill patients and factors that may affect them. Therefore the purpose of this paper is to synthesize literature findings on quality of life and mental fatigue in caregivers of cancer patients and to identify factors associated with caregivers' quality of life and mental fatigue. The specific aims of the present study are as follows:

Specific aim 1: To describe the quality of life and mental fatigue of family caregivers of advanced cancer patients on Phase I trials.

Specific aim 2: To use the stress coping theory of Lazarus and Folkman (1984) and Family Systems Theory to guide the review of literature pertaining to factors associated with quality of life and mental fatigue.

The results from this review will contribute to the body of knowledge pertaining to quality of life and mental fatigue of family caregivers of cancer patients participating in Phase I clinical trials. The proposed examination will provide valuable information that can be used to develop research questions aimed to support caregivers as they cope with the demands of the caregiver role.

Theoretical Framework

In this study, two theories will be used to guide the research. First, the Family Systems Theory (Figure 2-1) will provide the tenants of understanding the impact of illness on the families and the influence of families on the illness trajectory (Wright & Leahy, 1994). One of the main features of the Family Systems Theory is the dynamic, reciprocal nature of the family; a change in one member affects all members (Wright & Leahy). Second, the stress appraisal model will be used to identify variables that may impact on the quality of life and mental fatigue of family caregivers of patients participating in Phase I clinical trials (Figure 2-2). The model was adapted from the Transactional Model of Stress and Coping, originally developed by Lazarus and Folkman (1984). This framework was designed to describe the processes of adaptation from stress and coping. The premise of the model is that an individual's cognitive appraisal of a stressor mediates their reaction and ability to cope with the stressor. When met with a perceived stressful stimulus, people make judgments about the severity of the threat as well as the resources they have available to manage the situation (Lazarus & Folkman).

Review of the Literature

According to the model (Figure 2-2), antecedent factors are those pre-existing variables that may affect peoples' appraisal of their situation that may affect quality of life. Antecedent factors are 1) person factors, 2) social factors, and 3) illness related factors. The first antecedent factor, person factors, refer to the demographics such as *age*, *level of income*, *gender*, caregiver *comorbid conditions*, and caregiver *health status*. Baumgarten et al., (1992) studied the health effects of caregiving on family members. The authors reported that caregivers aged 65 and older were more at risk for experiencing stress, fatigue, headache, and depression than non-caregivers of the same age cohort. This finding may be attributed to not only the demands of the caregiver role, but also to an early undiagnosed health condition. Given and Sherwood (2006) found that the older the age of the caregiver, the more their physical agility and mobility accounted for in how effectively they performed their duties. In addition, older caregivers often have their own co-morbidities to contend with which may be compromised as the caregiving demands increase (Schulz & Beach, 1999). The elder caregiver may also be prone to social isolation and limited resources putting them at an increased risk for distress. On the contrary, a few studies have identified the younger age cohort to experience distress with caregiving over the elder caregivers (Dumont et al., 2006; Gilbar, 1999; Given et al., 2004; Nijboer et al. 2000). This may be due in part to younger caregivers reporting caregiving to have a significant impact on their schedule along with experiencing a greater sense of abandonment (Given, Stommel, Collins, King, & Given, 1990). This younger cohort may also feel a sense of restriction between the demands of work and social activities while trying to incorporate caregiving into the regimen.

Income is another person factor that can have an impact on quality of life. Kim and Spillers (2010) found that less affluent caregivers reported more psychological distress. This finding is consistent with Song et al. (2011) who identified higher family income as a predictor for enhanced quality of life. Increased income affords the patient-caregiver dyad with added resources to better assist in the caregiving role and as a result less perceived stress, and an enhanced sense of security. Williams et al. (2003) found caregivers with limited resources reported less satisfaction from the caregiving experience and had less time to spend in leisure activities. The caregivers' significant lower level of satisfaction may be due to their inability to participate in activities that help relieve stress, such as difficulty to access support groups, and unreliable means of transportation.

The *gender* of the caregiver may also have an effect on their quality of life. Studies have identified female caregivers as more likely to experience a high level of psychological distress than their male counterpart (Dumont et al. 2006; Hagedoorn, Sanderman, Buunk, & Woobes, 2002) and report less self-esteem in the caregiver role (DeFrias et al., 2005). These findings may be due to women being immersed in multiple roles such as other household activities along with caregiving; thereby they may become more exhausted by it. Research supports that women provide more hours of care, especially care that is considered more personal, and also more caregiving tasks (National Alliance for Caregiving and AARP, 2004). Investigators have identified female family caregivers were at higher risk for impaired cognitive functioning (Lee, Kawachi, and Grodstein, 2004).

The *comorbidities* of the caregiver may alter their capacity to provide care and support to cancer patients. In a descriptive study looking at the quality of life and health status of patient

caregiver dyads managing lung cancer, the authors discovered 57% of caregivers had multiple comorbidities which were significantly related to poorer physical quality of life (Sarna et al., 2006). A secondary analysis on caregivers of cancer patients who perceived their *health status* as poor found that they were more likely to experience symptoms of depression (Doorenbos et al., 2007). Pressler et al., (2009) studied family caregivers of patients with heart failure and found caregiver's physical health condition and perceived difficulty in the caregiving role predicted their health related quality of life.

Social factors are a second type of antecedent factor that may influence appraisal and outcomes of the caregiving experience. One social factor of particular importance is *social support* which is the exchange of assistance and helpful interactions. Social support is a shield or buffer to the detrimental effects on health caused by stress (Heaney & Israel, 2002). When provided, support helps to reduce uncertainty and worry, and people may gain a sense of personal control over the situation which leads to productive coping (Heaney & Israel). Many families of cancer patients report the need for more support. Kurtz, Given, Kurtz, and Given (1994) found that support from friends did not increase with demands on caregivers in the later stages of illness, which could be expected to lead to greater distress.

The findings that caregivers of advanced cancer patients experience less social support and poor quality of life is concerning. Caregivers perform many roles in assisting the cancer patient, including the provision of social support. Carey, Oberst, McCubbin, and Hughes (1991) found that their sample of caregivers reported providing emotional support as the most demanding, difficult caregiving task, creating the greatest burden. When caregivers are able to be emotionally supportive, it is associated with benefits for them as well: Shewchuk, Richards, and

Elliott (1998) found that caregiver expressive support over time was associated with decreased anxiety, and that decreased expressive support over time was associated with increased depression. Expressive support was found to be the best predictor of improvement in the caregiver.

The final antecedent factor, illness related factors may also impact the appraisal of the caregiving role along with affecting the caregivers' quality of life and mental fatigue. Researchers have identified the cancer patients' phase of illness to affect family members' well-being (Northouse, 1984). Two illness factors identified are *patient* and *caregiver symptoms*. Regarding *patient* illness factors, investigators have found that caregivers experience greater anxiety and depression at the onset of the palliative phase of illness and an increase in burden and depression in the terminal phase of illness (McCorkle et al., 1993; Oberst & James, 1985; Schulz & Williamson, 1991). Similarly, other researchers found a negative relationship with cancer stage and the caregiver physical, social, and total well-being (Wetizner, McMillan, & Jacobson, 1999; Matthews, Baker, & Spillers, 2004). Studies of cancer patients who experience a worsening in their physical condition, performance status, and overall health were found to have caregivers with worsening emotional distress (Northouse et al., 2007; Kim et al., 2008; Given et al., 2004). These studies suggest that the patient's advanced stage of illness is a significant factor that affects the caregiver's quality of life.

In addition to the antecedent factors, appraisal is a central variable in the stress coping model and is defined as how an individual perceives and forms the meaning of a stressor. This judgment shapes and builds the emotional and behavioral responses to a stressor (Lazarus & Folkman, 1984).

An important category of appraisal is *caregiver burden*. Researchers have found caregiver *burden* to be positively associated with symptoms of depression and anxiety, with deterioration in depression scores over time (Groß, Fossa, Sorebo, & Dahl, 2006; Phillips, Gallagher, Hunt, Der, & Carroll, 2009). As time increases in the caregiver role, self-perceived health decreases (Chang, Chiou, & Chen, 2010) which may lead to feeling of worry and irritation (Given et al., 2004).

Coping is a cognitive and behavioral response to manage the demands that are appraised as stressful (Lazarus, 1999). Two functions of coping are *problem (active)* and *emotion (avoidant)* focused. *Avoidant* coping strategies (escaping, self-blame) are associated with greater distress and poorer quality of life, while *active* coping strategies (problem solving, reframing, planning) are associated with less distress and lower psychological quality of life scores (Kershaw, Northouse, Charuwan, Schafenacker, & Mood, 2004; Fitzell & Pakenham, 2010; Ben-Zur, 2001). Little is known about how coping is related to mental fatigue.

The dependent variables are quality of life and mental fatigue. Quality of life is broadly defined by the National Cancer Institute (2011) as the overall enjoyment of life. When applied in the research context, the definition becomes more precise. Quality of life is a multifaceted construct. In a prospective study of family caregivers of advanced cancer patients receiving palliative care, Juarez, Ferrell, Uman, Podnos, and Wagman (2008) identified quality of life to encompass physical, psychological, social and spiritual well-being. The impact of the caregiving role on quality of life for family caregivers of patients with advanced-staged cancer has been reported in several studies (Northouse et al., 2002; Northouse et al., 2007; Clark et al., 2006). Due to the increased morbidity and mortality of advanced-stage cancer, those patients may

experience more disruptions in quality of life than patients in earlier stages (American Cancer Society, 2010), which can also affect the demands on their caregivers. Northouse et al. (2007) studied prostate cancer patient and spouse dyads across three phases of illness. The researchers found that dyads in the advanced phase were at a higher risk for psychosocial distress compared to dyads in the newly diagnosed or biochemical recurrence phases. Advanced cancer patients experienced a lower physical quality of life while spouses reported lower emotional quality of life.

This finding is supported by the work of Sarna et al. (2006) who studied the quality of life of dyads of women with lung cancer, including those with metastatic disease. The authors found that caregivers had a poorer emotional quality of life than the general population. Variables such as older age, presence of comorbidities, less education, and consumption of alcohol also put these family members at risk for poor physical quality of life. Other variables identified that placed the caregiver at greater risk for disruption in quality of life included female gender and spouse to the cancer patient (Kim et al., 2008).

Researchers have identified domains of quality of life to include the physical, psychological, social, and spiritual well-being (Ferrell, Hassey Dow, & Grant, 1995). Included in the psychological well-being is cognition and attention. The majority of cognition and attention studies in the oncology setting have been conducted on the patient (Brezden, Phillips, Abdoell, Bunston, & Tannock, 2000; Cole, Scialla, & Bednarz, 2000; Cull et al., 1996). Interestingly, the identification of mental fatigue was reported to be present in patients prior to receiving treatment (Wefel et al., 2004; Cimprich, So, Ronis, & Trask, 2005; Hermelink et al., 2007). Due to multiple distractions caused from learning a cancer diagnosis and competing for attention, there

is overuse of the inhibitory process needed to concentrate. The effort to inhibit distractions wanes, mental fatigue surmounts, and the risk for making mistakes increases (Kaplan & Kaplan, 1982).

As studies have shown caregivers to experience as much emotional distress or even more than patients, it is conceivable to question the presence of mental fatigue in the caregiver (Hasson-Ohayon et al., 2010; Northouse et al., 2002). In a cross-sectional correlational study on caregivers with a disabled or ill spouse, Lee, Kawachi, and Grodstein (2004) found a significant increase in risk for low cognitive function with female caregivers compared to non-caregiving females. The authors attribute this finding to the caregivers experiencing stress in their role. Researchers have described caregiving as a physical and psychological stress experience (Schulz & Martire, 2004; Schulz & Sherwood, 2008).

Research has demonstrated the effects of prolonged stress leads to prolonged exposure to cortisol. Cortisol suppresses the function of the hippocampus, the region of the brain central to learning and memory (McEwen & Magarinos, 1997). The impact of stress on cognition is further supported by a study of healthy volunteers. Mahoney, Dalby, and King (1998) observed a greater cognitive decline among individuals experiencing stress and anxiety. This finding further supports the necessity to study mental fatigue in the oncology family caregiver who face multiple demands and often experience stress associated with their role.

A few other studies have examined cognitive function in caregivers. Vitaliano et al. (2005) conducted a longitudinal study of caregivers of Alzheimer's disease. Over 2 years, caregivers demonstrated decline in verbal IQ scores along with an increase in scores on depression compared to non-caregiver controls. In a small study N=27 caregivers of terminally

ill family members (diagnosis not provided), the caregivers demonstrated significant impairment in attention. Among the impairments, monitoring self performance and concentration were identified (Mackenzie, Smith, Hasher, Leach, & Behl, 2007). Concentration is of critical importance to the caregiver, in particular of Phase I oncology patients.

Concentration is of critical importance to the caregiver, in particular of Phase I oncology patients, yet no studies have examined mental fatigue in these caregivers. They are often juggling multiple demands assisting patients with advanced disease who may have been heavily pre-treated and are currently receiving investigational treatment with hopes of response. In view of these demands, caregivers of Phase I oncology patients may be under more stress than caregivers in other phases of illness and at risk of mental fatigue.

Conclusion

In summary, research has demonstrated the impact multiple factors have on the quality of life and to a lesser degree mental fatigue of caregivers of advanced cancer patients. The factors include person, social, illness related, appraisal, and coping variables. The literature that was reviewed had gaps regarding quality of life and mental fatigue in caregivers of oncology patients. Although researchers have investigated caregivers of advanced stage cancer patients that may have included Phase I participants, this unique population has not been selected as a special subsample from the data. More studies are needed with a theoretical foundation for examining quality of life and mental fatigue in caregivers. The primary model cited for research on advanced cancer caregivers is Lazarus and Folkman's stress and coping theory or a version thereof. These studies have looked in to the caregiver quality of life but there are insufficient studies on domain specific factors such as cognition and attention. Further research is also

needed on the effect of the caregivers' pre-existing medical condition and their ability to provide care. The caregiving literature identifies the strain, burden and sequela of caregiving yet little is known about the attentional responses to the demands of caregiving-in particular the caregiver of patients enrolled in Phase I clinical trials.

The gaps in the research give way to more research questions. Do family caregivers of cancer patients experience mental fatigue? Are the caregivers more susceptible to mental fatigue than the patients? Does mental fatigue have consequences on quality of health and overall general health? Is the caregiver burden heightened as treatment side effects are not always known therefore the monitoring of symptoms is more pervasive? As little is known about the cognitive effects of caregiving on the family caregiver of cancer patients, proposed herein is a research design to help answer the important questions; describe the mental fatigue of family caregivers of patients receiving Phase I treatment, and examine factors associated with caregivers' mental fatigue.

Figure 2-1 Family Systems Model

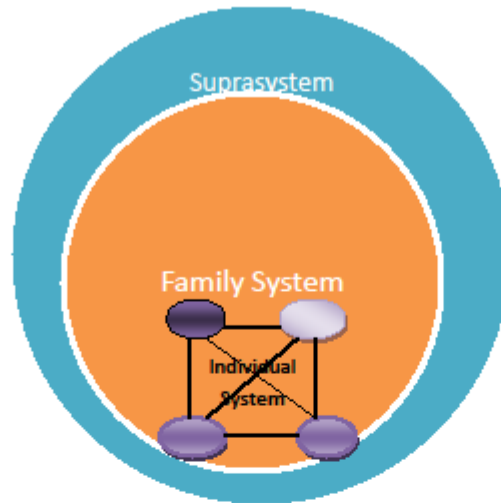
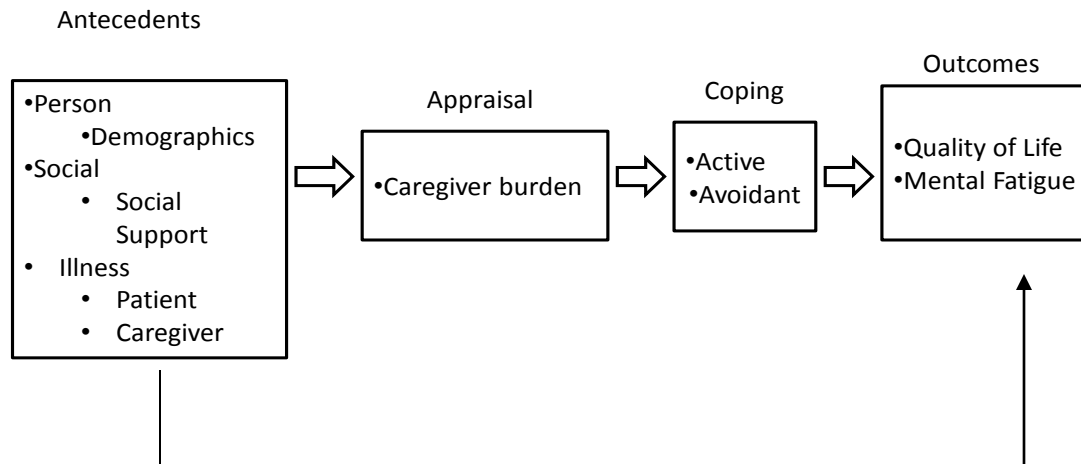


Figure 2-2 Stress and Coping Theoretical Model



References

- American Cancer Society. (2010). *Cancer facts and figures* [Brochure]. Atlanta, Georgia: Author.
- Baumgarten, M., Battisto, R. N., Infante-Rivard, C., Hanley, J. A., Becker, R., & Gauthier, S. (1992). The psychological and physical health of family members caring for an elderly person with dementia. *Journal of Clinical Epidemiology*, 45(1), 61-70.
- Ben-Zur, H. (2001). Your coping strategy and my distress: Interspouse perceptions of coping and adjustment among breast cancer patients and their spouses. *Families, Systems, and Health: the Journal of Collaborative Family HealthCare*, 19(1), 83-94.
- Brezden, C. B., Phillips, K. A., Abdoell, M., Bunston, & Tannock, I. F. (2000). Cognitive function in breast cancer patients receiving adjuvant chemotherapy. *Journal of Clinical Oncology*, 18(14) 2695-2701.
- Carey, P. J., Oberst, M. T., McCubbin, M. A., & Hughes, S. H. (1991). Appraisal and caregiving burden in family members caring for patients receiving chemotherapy. *Oncology Nursing Forum*, 18(8), 1341-1348.
- Chang, H-Y, Chiou, C-J, & Chen, N-S (2010). Impact of mental health and caregiver burden on family caregivers' physical health. *Archives of Gerontology and Geriatrics*, 50, 267-271.

- Cimprich, B. (1995). Symptom management: Loss of concentration. *Seminars in Oncology Nursing*, 11(4), 279-288.
- Cimprich, B. So, H., Ronis, D. L., & Trask, C. (2005). Pretreatment factors related to cognitive functioning in women newly diagnosed with breast cancer. *Psycho-Oncology*, 14(1), 70-78.
- Clark, M. M., Rummans, T. A., Sloan, J. A., Jensen, A., Atherton, P. J., Frost, M. H....Brown, P., D. (2006). Quality of life of caregivers of patients with advanced-stage cancer. *American Journal of Hospice and Palliative Medicine*, 23, 185.
- Cole, R. P., Scialla, S. J., & Bednarz, L. (2000). Functional recovery in cancer rehabilitation. *Archives of Physical Medicine and Rehabilitation*, 81(5), 623-627.
- Cull, A., Hay, C., Love, S. B., Mackie, M., Smets, E., & Steward, M. (1996). What do cancer patients mean when they complain of concentration and memory problems? *British Journal of Cancer*, 74, 1674-1679.
- Defrias, C. M., Tukko, H., & Rosenberg, T. (2005). Caregiver physical and mental health predicts reactions to caregiver. *Aging and Mental Health*, 9, 331-336.
- Doorenbos, A. Z., Given, B., Given, C. W., Wyatt, G., Gift, A., Rahbar, M., Sangehoon, J. (2007). The influence of end-of-life cancer care on caregivers. *Research in Nursing and Health*, 30(3), 270-281.
- Dumont, S., Turgeon, J., Allard, P., Gagnon, P., Charbonneau, C., & Vizina, L. (2006). Caring for a loved one with advanced cancer: Determinants of psychological distress in family caregivers. *Journal of Palliative Medicine*, 9(4), 912-921.

- Ferrell, B. R., Hassey Dow, K., & Grant, M. (1995). Measurement of the quality of life in cancer survivors. *Quality of Life Research*, 4, 523-531.
- Fitzell, A., & Pakenham, K. I. (2010). Application of a stress and coping model to positive and negative adjustment outcomes in colorectal cancer caregiving. *Psycho-Oncology*, 19(11),
- Gilbar, O. (1999). Gender as a predictor of burden and psychological distress of elderly husbands and wives of cancer patients. *Psycho-Oncology*, 8(4), 287.
- Given, B., & Sherwood, P. R. (2006). Family care for the older person with cancer. *Seminars in oncology Nursing*, 22(1), 43-50.
- Given, B., Stommel, M., Collins, C., King, S., & Given, C. W. (1990). Responses of elderly spouse caregivers. *Research in Nursing and Health*, 13(2), 77-85.
- Given, B., Wyatt, G., Given, C., Sherwood, P., Gift, A., Devoss, D., Rahbar, M. (2004). Burden and depression among caregivers of patients with cancer at the end of life. *Oncology Nursing Forum*, 31(6), 1105-1115.
- Grov, E. K., Fossa, S. D., Sorebo, O., & Dahl, A. A. (2006). Primary caregivers of cancer patients in the palliative phase: A path analysis of variables influencing their burden. *Social Science and Medicine*, 63, 2429-2439.
- Hagedoorn, M., Sanderman, R., Buunk, B. P., & Woobes, T. (2002). Failing in spousal caregiving: the 'identity-relevant stress' hypothesis to explain sex differences in caregiver distress. *British Journal of health Psychology*, 7(4), 481-494.

- Hasson-Ohayon, I., Goldzweig, G., Braun, M., & Galinsky, D. (2010). Women with advanced breast cancer and their spouses: Diversity of support and psychological distress. *Psycho-Oncology*, 19(11), 1195-1204.
- Heaney, C. A., & Israel, B. A. (2002). Social networks and social support. In K. Glanz, B.K. Rimer & F.M. Lewis (Eds.), *Health behavior and health education: Theory, research, and practice* (3rd ed., pp. 185-209). San Francisco, CA: Jossey-Bass.
- Hermelink, K., Untch, M., Lux, M. P., Kreienberg, R., Beck, T., Bauerfeind, I., & Munzel, K. (2007). Cognitive function during neoadjuvant chemotherapy for breast cancer: Results of a prospective, multicenter, longitudinal study. *Cancer*, 109, 1905-1913.
- Horstmann, E., McCabe, M. S., Grochow, L., & Yamamoto, S. (2005). Risks and benefits of Phase I oncology trials, 1991-2002. *The New England Journal of Medicine*, 352(9), 895-905.
- Jensen, S., & Given, B. A. (1991). Fatigue affecting family caregivers of cancer patients. *Cancer Nursing*, 14(4), 181-187.
- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. New York, NY: Cambridge University Press.
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, 15, 169-182.
- Kaplan, S., & Kaplan, R. (1982). *Environment and Cognition*. New York, NY: Praeger.

- Kershaw, T., Northouse, L., Charuwan, K., Schafenacker, A., & Mood, D. (2004). Coping strategies and quality of life in women with advanced cancer and their family caregivers. *Psychology and Health, 19*(2), 139-155.
- Kim, Y., Kashy, D. A., Wellisch, D. K., Spillers, R. L., Kaw, C. K., & Smith, T. G. (2008). Quality of life of couples dealing with cancer: Dyadic and individual adjustment among breast and prostate cancer survivors and their spousal caregivers. *Annals of Behavioral Medicine, 35*(2), 230-238.
- Kim, Y., & Spillers, R. L. (2010). Quality of life of family caregivers at 2 years after a relative's cancer diagnosis. *Psycho-Oncology, 19*(4), 431-440.
- Kohara, I., & Inoue, T. (2010). Searching for a way to live to the end: Decision-making process in patients considering participation in cancer Phase I clinical trials. *Oncology Nursing Forum, 37*(2), E124-E132.
- Kurtz, M. E., Given, B., Kurtz, J. C., & Given, C. W. (1994). The interaction of age, symptoms, and survival status on physical and mental health of patients with cancer and their families. *Cancer, 74*, 2071-2078.
- Kurtz, M. E., Kurtz, J. C., Given, C. W., & Given, B. A. (2004). Depression and physical health among family caregivers of geriatric patients with cancer-a longitudinal view. *Medical Science Monitor, 10*(8), CR447-56.
- Lazarus, R. S. (1999). *Stress and Emotion: A New Synthesis*. New York, NY: Springer.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, NY: Springer Publishing Company.

- Lee, S., Kawachi, I., & Grodstein, F. (2004). Does caregiving stress affect cognitive function in older women? *The Journal of Nervous and Mental Disease*, 192(1), 51-57.
- LoRusso, P. M., Boerner, S. A., & Seymour, L. (2010). An overview of optimal planning, design, and conduct of phase I studies of new therapeutics. *Clinical Cancer Research*, 16(6), 1710-1718.
- Mackenzie, C. S., Smith, M. C., Hasher, L., Leach, L., & Behl, P. (2007). Cognitive functioning under stress: Evidence from informal caregivers of palliative patients. *Journal of Palliative Medicine*, 10(3), 749-758.
- Mahoney, A. E., Dalby, J. T., & King, M. C. (1998). Cognitive failures and stress. *Psychological Reports*, 82, 1432-1434.
- Matthews, A., Baker, F., & Spillers, R. L. (2004). Family caregivers' quality of life: Influence of health protective stance and emotional strain. *Psychology and Health*, 19(5), 625-641.
- McCorkle, R., Yost, L. S., Jepson, C., Malone, D., Baird, S., & Lusk, E. (1993). A cancer experience: Relationship of patient psychosocial responses to caregiver burden over time. *Psycho-Oncology*, 2, 21-32.
- McEwen, B. S., & Magarinos, A., M. (1997). Stress effects on morphology and function of the hippocampus. *Annals of the New York Academy of Sciences*, 821(1), 271-284.

National Alliance For Caregiving And AARP. (2004, April). *Caregiving in the U.S.*

Retrieved August 17, 2011, from

<http://www.caregiving.org/pdf/research/04keyfindings>

National Cancer Institute. (2011). *National Cancer Institute*. Retrieved May 11, 2011,

from <http://www.cancer.gov>

Nijboer, C., Triemstra, M., Tempelaar, R., Mulder, M., Sanderman, R., & van den Bos,

G. A. (2000). Patterns of caregiver experiences among partners of cancer patients.

The Gerontologist, 40(6), 738-746.

Northouse, L. (1984). The impact of cancer on the family: An overview. *International*

Journal of Psychiatry in Medicine, 14(3), 215-242.

Northouse, L. L., Mood, D., Kershaw, T., Schafenacker, A., Mellon, S., & Walker,

J.,...Decker, V. (2002). Quality of life of women with recurrent breast cancer and

their family members. *Journal of Clinical oncology*, 20(19), 4050-4064.

Northouse, L. L., Mood, D. W., Schafenacker, A., Montie, J. E., Sandler, H. M., &

Forman, J. D.,...Kershaw, T. (2007). Randomized clinical trial of a family

intervention for prostate cancer patients and their spouses. *Cancer*, 110(12), 2809-

2818.

Oberst, M. T., & James, R. H. (1985). Going home: Patient and spouse adjustment

following cancer surgery. *Topics in Clinical Nursing*, 7(1), 46-57.

Phillips, A. C., Gallagher, S., Hunt, K., Der, G., & Carroll, D. (2009). Symptoms of

depression in non-routine caregivers: the role of caregiver strain and burden.

British Journal of Clinical Psychology, 48, 335-346.

- Posner, M. I., & Snyder, C. R. (1975). Facilitation and inhibition in the processing of signals. In P.M.A. Rabbit & S. Dornic (Eds.), *Attention and performance* (Vol. V, pp. 669-682). New York, NY: Academic Press.
- Pressler, S. J., Gradus-Pizlo, I., Chubinski, S. D., Smith, G., Wheeler, S., Wu, J., Sloan, R. (2009). Family caregiver outcomes in heart failure. *American Journal of Critical Care, 18*(2), 149-159.
- Sarna, L., Cooley, M. E., Brown, J. K., Williams, R. D., Chernecky, C., Padilla, G., Danao, L. L. (2006). Quality of life and health status of dyads of women with lung cancer and family members. *Oncology Nursing Forum, 33*(6), 1109-1116.
- Schulz, R., & Beach, S. R. (1999). Caregiving as a risk factor for mortality: the caregiver health effects study. *Journal of the American Medical Association, 282*(23), 2215-2219.
- Schulz, R., & Martire, L. M. (2004). Family caregivers of persons with dementia; Prevalence, health effects, and support strategies. *American Journal Geriatric Psychiatry, 12*(3), 240-249.
- Schulz, R. & Sherwood, P. R. (2008). Physical and mental health effects of family caregiving. *American Journal Nursing, 108*(9-Suppl), 23-27.
- Schulz, R., & Williamson, G. M. (1991). A two-year longitudinal study of depression among Alzheimer's caregivers. *Psychology and Aging, 6*, 569-578.
- Sherwood, P. R., Given, C. W., Given, B. A., & Von Eye, A. (2005). Caregiver burden and depressive symptoms: Analysis of common outcomes in caregivers of elderly patients. *Journal of Aging and Health, 17*(2), 125-147.

- Shewchuk, R. M., Richards, J. S., & Elliott, T. R. (1998). Dynamic processes in health outcomes among caregivers of patients with spinal cord injuries. *Health Psychology, 17*(2), 125-129.
- Song, L., Northouse, L. L., Braun, T. M., Zhang, L., Cimprich, B., Ronis, D. L., Mood, D. W. (2011). Assessing longitudinal quality of life in prostate cancer patients and their spouses: A multilevel modeling approach. *Quality of Life Research, 20*, 371-381.
- Swore Fletcher, B. A., Dodd, M. J., Schumacher, K. L., & Miaskowski, C. (2008). Symptom experience of family caregivers of patients with cancer. *Oncology Nursing Forum, 35*(2), E23-E44.
- Vitaliano, P. P., Echeverria, D., Yi, J., Phillips, P. E., Young, H., & Siegler, I. C. (2005). Psychophysiological mediators of caregiver stress and differential cognitive decline. *Psychology and Aging, 20*(3), 402-411.
- Wefel, J.S., Lenzi, R., Theriault, R. L., Davis, R. N., & Meyers, C. A. (2004). The cognitive sequelae of standard-dose adjuvant chemotherapy in women with breast carcinoma: Results of a prospective, randomized, longitudinal trial. *Cancer, 100*, 2292-2299.
- Weitzner, M. A., McMillan, S. C., & Jacobson, P. B. (1999). Family caregiver quality of life: Differences between curative and palliative cancer treatment settings. *Journal of Pain and Symptom Management, 17*(6), 418-428.

Williams, A. M., Forbes, D. A., Mitchell, J., Essar, M., & Corbett, B. (2003). The influence of income on the experience of informal caregiving: Policy implications. *Health Care for Women International*, 24(2), 280-291. 1171-1178.

Wright, L. M., & Leahey, M. (1994). *Nurses and families: A guide to family assessment and intervention* (2nd ed.). Philadelphia, PA: F. A. Davis Company.

Chapter III

Qualitative Analysis of the Experience of Mental Fatigue in Family Caregivers of Cancer Patients on Phase I Trials

Introduction

Despite the many advances in treating cancer, metastatic cancer remains an incurable disease and a major threat to patients and caregivers. Certain tumor types have few if any treatment options in the metastatic setting. Some patients with advanced cancer seek Phase I clinical trials as a means of finding hope. Phase I clinical trials are the initial step in the translation of research from the laboratory to the clinical arena. These early studies of experimental therapies are designed to assess safety and tolerability of a drug, as well as the body's effect on that drug (pharmacokinetics). Patient benefit is not the intent of these studies and they are typically offered to patients who are refractory to standard therapies and have few, if any, remaining treatment options (LoRusso, Boerner & Seymour, 2010). Oncology patients participating in Phase I clinical trials are generally heavily pre-treated, have a poorer prognosis, and enter treatment that may cause serious side effects. Yet, patients remain optimistic about tumor response. Family caregivers of these patients are faced with uncertainty of treatment response, while working to provide assistance with gathering information, management of treatment side effects, and navigating clinic appointments and treatment schedules.

Although the demands of care are high for caregivers of cancer patients participating in Phase I clinical trials, there has been little research on the experience of these caregivers and how that experience affects their quality of life and their mental fatigue. Mental fatigue, an aspect of quality of life, is the inability to prevent distractions from interfering with directed attention due to fatigue of the neural inhibitory process. The fatigue occurs as a result of excess use of the neural inhibitory process to limit distractions that can hinder a person's ability to maintain focus on the demands of the present task (Kaplan & Kaplan, 1989; Posner & Snyder, 1975).

In order for caregivers to concentrate and direct attention, it is necessary for them to resist distraction and redirect mental effort to the task at hand. The inability to direct attention leads to reduced effectiveness and discomfort (Kaplan, 1995). Research indicates that caregivers can have difficulty maintaining their focus because of perceived distress from assuming the role of caregiver. Caregiver distress is often associated with the provision of physical care, performing procedures, coping with lifestyle changes, and providing emotional support to patients and other members of the family (Nijboer, Tempelaar, Triemstra, van den Bos, & Sanderma, 2001; Northouse, Dorris & Charron-Moore, 1995; Given & Given, 1991). These demands placed on the caregiver may pre-occupy the individual and pose distractions. Mental fatigue can occur when caregivers are less able to block distractions from interfering with caregiving, which then adversely affects their ability to perform demanding tasks (Kaplan & Kaplan, 1982; Cimprich, 1992, 1993, 1995). Loss of attentional capacity could impair mental processes such as problem solving, planning, execution of plans, decision making, and social interactions.

Even though prior research indicates that caregivers are at risk for mental fatigue few studies have examined caregivers experience with mental fatigue. The purpose of this paper was to obtain qualitative data on caregivers' experience of mental fatigue, identify strategies they use to manage it and ascertain the kind of help they would like from health professionals.

Theoretical Framework and Review of Literature

Theoretical Framework

The theoretical framework guiding this study is the Family Systems Theory. This theory views the family as a unit with members related to one another in an interdependent manner. Individual members are viewed as a part of a family system interacting in a reciprocal fashion. Stress in one member has a reverberating effect on other family members. Caregivers are not isolated individuals rather they are affected by their individual system, dyadic subsystem (e.g. patient and family caregiver) and larger family system (Wright & Leahey, 1994). Based on family systems theory, cancer patients and their family caregivers have a shared effect on one another. The caregiver is not excluded from the effects of the patient's cancer but rather experiences the stressful effects of the illness as well. The particular focus of this study is on the family caregiver and how caring for a cancer patient on a Phase I trial may affect the well-being, in particular mental fatigue, of the family caregiver.

Review of the Literature

Executive function requires a focus on relevant information while inhibiting irrelevant stimuli (Barkley, 1996). Directed attention is responsible for processing information into working memory and is selective with this process, functioning as a gatekeeper for the limited capacity available, thereby determining which items will occupy working memory. The executive attention process is the active updating and manipulation of information in working memory, part of a multifaceted relationship between directed attention and working memory.

In order for learning and appropriate human behavior to occur, directed attention is needed to process information into working and long-term memory. When the inability to avoid the pervasiveness of distractions occurs, individuals find engaging in activities requiring directed attention very difficult (Kaplan, 1995).

Mental fatigue can be manifested in various ways. The outcome of prolonged unrested mental energy is often seen in individuals who respond to the environment with irritability, reduced effectiveness, frustration, impatience, and strained social relations (Kaplan, 2001). These cognitive manifestations of mental fatigue are related to the loss of concentration and distractions lead to an inability to maintain a proper train of thought. Activities under executive control are altered, including planning, setting goals, initiating or persevering in effortful activities, and the modification of behavior (Cimprich, 1995). Therefore impaired learning, remembering, planning, problem solving, behavior modification, ability to apply generalizations to a novel experience, and reading are among a list of symptoms related to mental fatigue (Morris, 1996).

Schulz and Sherwood (2008) describe caregiving as a chronic physical and psychological stress experience. Exposure to chronic stress provokes the secretion of catecholamines and glucocorticoids. Prolonged exposure to these cytokines negatively affects synaptic plasticity and loss of neurons thereby leading to diminished attention, working memory, and long term memory (McEwen & Sapolsky, 1995). Cortisol suppresses the function of the hippocampus, the region of the brain central to learning and memory (McEwen & Magarinos, 1997). As studies have shown caregivers to experience as much emotional distress as patients, or even more, it is reasonable to expect the presence of mental fatigue in caregivers (Hasson-Ohayon, Goldzweig, Braun, & Galinsky, 2010; Northouse et al., 2002). In a cross-sectional correlational study on caregivers with a disabled or ill spouse, Lee, Kawachi, and Grodstein, (2004) found a significant increase in risk for low cognitive function with female caregivers compared to non-caregiving females. The authors attribute this finding to the stress that caregivers experience in their role. Caregivers of terminally ill family members demonstrated significant impairment in attention, including reduced monitoring of self-performance and concentration (Mackenzie, Smith, Hasher, Leach, & Behl, 2007).

Concentration is of critical importance to caregiving, in particular to the caregivers of Phase I oncology patients. Caregiving for this unique group of patients may be complex and difficult. These caregivers are juggling multiple demands assisting patients with advanced disease who may have been heavily pre-treated and are currently receiving investigational treatment. Inherent in this role is monitoring for treatment response, adverse reactions along with assisting with symptom management.

While caregivers of cancer patients enrolled in a Phase I clinical trial are at risk for mental fatigue, there has been little research on the experience of these caregivers. The aims of this study were to 1) examine the experience of mental fatigue in family caregivers of cancer patients participating in Phase I clinical trials, 2) evaluate the extent to which caregivers' perceive that mental fatigue interferes with their caregiving, 3) identify the type of distractions that affect caregivers' ability to direct attention, and 4) examine the strategies that caregivers use to manage mental fatigue.

Methods

Design

This paper presents findings of a descriptive cross-sectional study using qualitative methodology. Seventy-nine family caregivers of patients who were participating in a Phase I clinical trials were interviewed for this study. The patients were not interviewed but provided consent to have descriptive data obtained from their medical record (e.g., their type of cancer).

Sample

The sample was drawn from the Phase I Cancer Program at a comprehensive cancer center in the Midwest. Caregivers were eligible to participate in the study if they met the following inclusion criteria: being 18 years or older, identified by patients as their primary caregiver (i.e., provider of emotional and/or physical care), cognitively intact (score > 24 on the Mini Mental State Exam), and had command of the English language. Patients of the caregiver had to be 18 years or older, enrolled or in the process of enrollment into a Phase I clinical trial, and have command of the English language.

Subjects were excluded if less than 18 years of age, cognitively impaired (score < 24 on the mini Mental State Exam) and not proficient in the English language.

A total of 85 patient/caregiver dyads who met eligibility criteria were approached by a research assistant and asked to participate in the study. Of these, 79 dyads completed the study (response rate was 93%). Three patients were not interested in participating, two caregivers were unable to consent due to travel distance and work obligations, and one caregiver declined stating the questionnaire was too involved.

Procedures

Study approval was obtained from the human investigation committee at the cancer center, and affiliated universities. Potential participants were identified by the Phase I medical team. The patient and caregiver were approached and questioned about their potential interest in the study. Dyads willing take part in the study gave consent to the principal investigator or research assistant. The majority of the consenting was performed at the medical center, while others were obtained at their home or work. In general the caregivers filled out the questionnaires in the clinic or at home and returned them in person. Three caregivers returned the questionnaires by mail.

Data Collection

Data were collected between January and August 2013. Data collection consisted of demographic questionnaire along with a researcher devised qualitative questionnaire made up of open-ended questions. The open-ended questions explored the caregivers' definition and experience of mental fatigue, self-care and symptom management (Figure 3-1).

Data Analysis

The de-identified questionnaires were transcribed verbatim into an excel spread sheet. The data were imported into NVIVO 10, an electronic qualitative data analysis package. Each response was reviewed and coded by the investigator into common themes. In order to prevent researcher biases word frequency queries were run on the qualitative software to check for theme reliability. SPSS version 21 was used to analyze demographic data and descriptive statistics were used to describe the demographic characteristics of the sample.

Results

Sample Characteristics

The average age of family caregivers of cancer patients participating in this study was 54.8 years (± 14 , range: 18-80). The majority were female (63%), Caucasian (58%), and college educated (56%), with 39% reporting an annual household income greater than \$75,000. The majority of the caregivers were spouses (58%) of the patient. Nearly half of the caregivers worked outside the home (48%). Over half of the caregivers (58%) reported having at least one co-morbidity (see Table 3-1).

Themes Obtained from Qualitative Data

Three major themes were identified from the data: 1) caregiver's characterization of mental fatigue, 2) ways caregivers manage mental fatigue, and 3) benefits of caregiving (see Table 3-2).

Experience of mental fatigue:

Analysis of caregivers' description of their mental fatigue resulted in four subthemes: a) definition of mental fatigue, b) problems with memory and concentration, c) effect on caregiving role, and d) hindering ability to maintain own self-care.

Definition of mental fatigue: When asked about their definition of mental fatigue, the majority of the caregivers mentioned feeling tired; others described difficulty concentrating, while several described being overwhelmed by their circumstances. One husband wrote, "Being mentally tired which can cause physical tiredness." A husband defined mental fatigue as "Feeling tired, depressed, while trying hard to be optimistic." Another person defined mental fatigue as "My mind churning and thinking of stressful decisions continuously." A female relative provided this definition: "Challenged beyond my capacity to cope, and not having enough recovery time." As indicated by these quotes, caregivers were able to clearly describe what mental fatigue meant to them.

Problems with memory and concentration: The main symptom of mental fatigue was the inability to concentrate or remember things. When asked if they had trouble concentrating or remembering things, 69% of the caregivers acknowledged having had the experience. A wife stated, "My short term memory has become basically non-existent." A husband admitted to having difficulty "Remembering to remind the patient about timing of drugs, remembering conversations, and social activities." A daughter that manages a veterinary clinic said, "I have had trouble remembering to do basic things like feed my dogs. I had to make a calendar for me to check off because they were either getting fed too much or not at all." A young wife wrote, "I keep lists, calendars and notes

as a constant reminder of our schedules. It is easy to get sidetracked with a toddler and spouse.” Another wife wrote, “If I am getting his medications together or doing his dressings and have to stop for something else, I sometimes forget what I was doing.” A husband shared, “I turn pages in a book but don’t know what the words meant.” Each of these statements characterize caregivers’ problem with memory and concentration.

Effect on caregiving role: The caregivers were asked if mental fatigue hindered caregiving or the quality of care they provided. A very large majority, 75 %, stated that mental fatigue did not interfere in their caregiver role, and 78% rated their care as above average to excellent. Some (21%) described their quality of care as average. For example, a female relative explained, “I feel like there’s so much to take care of that’s so important. Feel I may not be doing my best. One caregiver (1.3%) rated his caregiving as poor.

Caregivers reported experiencing symptoms of irritability during the course of caregiving and feeling irritable during the provision of care. A wife stated, “I’m sure I have been short with Joe at times.” A female relative explained, “When I feel tired and overwhelmed it can make me short tempered.” A son disclosed, “I tend to be shorter and more easily annoyed with her at times.” A wife wrote, “Sometimes I can’t be as tolerant as I should/could be.” A brother wrote, “Perhaps I am not as attentive as I should be.” A wife shared, “Sometimes I need patience with his meds.” A sister commented, “I may sometimes snap at him or not be fully attentive, then we both feel bad.”

When caregivers were asked to identify distractions to directed attention, most mentioned persistent intrusive thoughts. A wife stated, “Knowing my husband is not

feeling well, or his tumors appear larger.” Another wife listed, “The cancer, making sure he is eating correctly, getting exercise, and keeping his mood positive.” A few husbands summarized, “Thinking about my wife’s condition,” “Worrying for my loved one, making sure she is following her regimen,” and “Making her always the first priority.” A father stated, “Concern for daughter’s pain.” A husband wrote, “I sometimes find it overwhelming...like I have no control of the situation. I do not like that feeling. The unknown really is the worst part. I want to help but can’t sometimes.” In this thematic area, most caregivers reported that they provided high quality of care but were irritable at times and distracted by worry and concern for their loved one.

Effect on own self-care. The caregivers were asked if mental fatigue interfered with self-care. The majority of caregivers reported that caregiving made an impact on caring for themselves, in particular with routine health activities. A granddaughter stated that “I spend more time doing things for her, leaving less time for my life.” A wife described her caregiving experience: “I don’t have the energy to stay in touch with others as I should. I don’t exercise like I use to.” Another wife stated, “I...have...less overall care for my appearance. I forget to take medications...and exercise. I am diabetic and not following my diet as close as I was before.” A husband wrote, “I don’t care for myself well at all. I need to and my doctor is trying to get me on a better track. But I will always put my wife and kids before myself.” A daughter wrote, “Often I am too tired to work out or eat healthy.” A husband shared, “Sometimes I will skip a meal or hygiene activity.” A sister reflected, “I spend less time on physical appearance.” A husband noted, “I feel uninterested about my health.” Finally a husband wrote, “I’ve been drinking alcohol more

to cope.” As these examples indicate, the majority of caregivers had difficulty with self-care.

Management of mental fatigue

A second major theme from the qualitative data is how caregivers manage mental fatigue. The subthemes in this area were: 1) self-care strategies and 2) assistance they would like from health professionals.

Of the self-care strategies listed, a large percentage of caregivers (38%) stated that they use rest as the means to manage mental fatigue. This was followed by exercise (30%), talking it over with family or friends (14%), and reading (13%). Some caregivers mentioned self-medication (8%), or watching TV (6%), and a few others reported activities such as knitting, lighting a candle, and praying (2% each).

A wife wrote, “I take a nap, watch some up-beat TV to change the outlook of my mind that keeps running over and over the same things.” Another wife noted, “I nap when he does and always have a fiction book going.” A sister shared, “Reassign activities to something physical.” A husband mentioned, “Play basketball and talk with good friends.” A wife listed, “Take Xanax as needed-it helps me breathe, go for a walk, watch a movie, turn off my phone.”

The caregivers were asked to identify ways the healthcare system could assist them in managing mental fatigue. The most frequent response (19%) was to have more social support available, i.e., social worker, group and individual resources, even though only a few (10%) reported being satisfied with the support they received. Support was

followed closely by the need for more information (16%), including the caregiver in discussions (8%) and assistance with insurance (8%).

A husband mentioned, “Keep things as simple as possible. Verbal pats on the back. Include caregiver in conversations. Understand caregiver has own pain.” A wife cited, “Listen to the caregiver’s assessment of what is happening to the patient. Include us in the treatment plans.” Other husbands wrote, “Provide gripe sessions”; “More support systems”; “Offer people opportunity to talk to counselors. Maybe a group setting so others could help each other. Our problem is we travel 4 hours to come here.” A male relative wrote, “Assistance with transportation and medical bills.”

Benefits of Caregiving

At the conclusion of the questionnaire, the caregivers were asked to add insight on their caregiving experiences. Many of the caregivers (29%) relayed that caregiving is hard work, while 25% described the role as fulfilling.

A daughter wrote, “No matter how crappy or overwhelmed I’m feeling I wouldn’t have it any other way. I love the relationships I’ve formed with my mom’s health team. And no matter what, I know I’m doing everything I can. It’s totally exhausting!” A friend noted, “I am honored to have the opportunity. I am a cancer survivor myself.” A husband remarked, “It is a tough job but I would do anything for Susan.” A daughter wrote, “Prior to becoming the primary caregiver I focused more on myself and my happiness. This illness was a tornado of events and has thrown my life out of whack. I have not been able to do things/enjoy as much. However I would not give up the opportunity to be with my mother and help her through this.”

Discussion

The lives of family caregivers of cancer patients enrolled in a Phase I clinical trial are difficult yet rewarding. The experience of mental fatigue can cause frustration to an already overloaded system. Caregivers often worked outside the home as well as helped support the patient with appointments, while balancing their own medical needs. Caregivers were able to define mental fatigue, utilizing key terms such as “difficulty concentrating” and “feeling tired.” The caregivers’ definitions of mental fatigue were consistent with the definition of mental fatigue in the research literature which defines mental fatigue as the waning ability to inhibit distraction from directed attention (Kaplan & Kaplan, 1982), due to multiple distractions competing for attention. Mental fatigue is reached when the individual is aware of the higher level of effort needed to pay attention which is consistent with the statements made by caregivers in this study.

In this study most caregivers reported that mental fatigue did not interfere with their ability to provide care and the majority of them rated their care above average. The interesting finding here is that caregivers perceived they were able to provide excellent care in spite of having mental fatigue. The qualitative reports from these Phase I caregivers conflicts with the quantitative findings by Mackenzie, Smith, Hasher, Leach, and Behl (2007) in their study of caregivers of palliative patients. Using quantitative measures of memory and attention Mackenzie et al. found that caregivers had lower scores on these measures when compared to non-caregiver controls. However, consistent with Mackenzie et al.’s study, caregivers of patients in palliative care also reported symptoms of irritability and short temperament that are characteristic of mental fatigue.

While the research participants did not view mental fatigue as interfering with caregiving, they did recognize that it interfered with self-care. This finding is similar to the results from Beesley, Price, and Webb (2011) who studied health behavior change in caregivers of family members with ovarian cancer. More than half of the caregivers in that study reported a worsening in their health routine, less physical activity, weight gain and poor diet choices. In addition to less self-care, more than half of the caregivers of Phase I patients in the current study had at least one comorbidity. This finding is of concern because caregivers who reported caregiver strain and a pre-existing co-morbidity had a higher mortality rate four years after taking on the caregiver role compared to non-caregiver controls (Schulz & Beach, 1999). It is possible that as caregivers neglect their own health, (i.e., getting inadequate sleep, exercise and forgetting to take their own medications) they further compromise pre-existing conditions and put their own health at greater risk for future problems.

A large percentage of the caregivers utilized rest to manage mental fatigue. This may be beneficial if the caregivers are fully able to take their minds away from what is inhibiting directed attention. Sleep may provide some recovery, although it is not all that is required. There are other ways to conserve mental energy and to help combat mental fatigue. Barsesvick et al., (2004) conducted a randomized clinical trial to study cancer patients receiving treatment with complaints of fatigue. The information provided to these patients consisted of pacing activities, setting priorities with cognitive restructuring, active problem solving, and patient/family education. Caregivers in this study could

benefit from this information because they seldom reported using these types of strategies.

Research on caregivers of cancer patients indicates that obtaining information is one of their needs (Stenberg, Ruland, & Miaskowski, 2009). Caregivers felt responsible for obtaining information in addition to the information that they received in the clinic. Caregivers wanted information about diagnosis, treatment, side effects, symptom management and physical care. When an unexpected event occurred, it prompted caregivers' need to seek and gather information. This process of obtaining information was described as beneficial, an integral element of providing care, in order to be better prepared for the caregiver role. Iconomou, Vagenakis, and Kalofonos (2001) studied caregivers' needs and found the heightened need for information regarding cancer specific material. They also found that caregivers' need for information was independent of their level of anxiety and depression. It is possible that when caregivers have difficulty obtaining information along with uncertainty about the illness and treatment, that in turn poses a distraction to directed attention thereby interfering with comprehension and retention.

Studies have also demonstrated that caregivers experience social isolation and worry associated with caregiving (Weitzner et al., 1997) and many researchers report the fatiguing effects of uncertainty throughout the caregiving process. Hinds (1985) reported uncertainty as the primary contributor to the stress associated with caregiving. Caregivers are forced to adjust to illness progression, impending loss, decreased intimacy, the accumulation of losses, and revised expectations that may lead to sadness, anger,

disappointment, and hopelessness (Kurtz, Kurtz, Given & Given, 1995; Given et al., 2004). Directing attention to these emotions leaves less attentional capacity for the individual to attend to the task at hand (Baddeley, 2007). Therefore, preoccupation with worry and potential threat may manifest as mental fatigue.

The tenets of family systems theory were relevant to the current study of mental fatigue in family caregivers of cancer patients. The theory provided the rationale for including family members in the assessment of untoward effects of the cancer experience.

Clinical Implications

This is among the first study to explore mental fatigue in family caregivers of cancer patients. The caregivers indeed experienced mental fatigue, yet perceived little interference with their ability to provide care. Despite the presence of mental fatigue, the caregivers reported that they performed above average in their role but often compromised their own health to provide high quality of care. This finding suggests a need for healthcare professionals to give attention to the health care needs of the family caregivers. In addition to assessing the needs of the patient, health care providers need to assess the health practices of caregivers and encourage them to attend to their own health so that they can continue to provide care to the patient.

Participants also wanted more information and social support. Health professionals need to provide information to caregivers about the nature of the patient's illness and treatments for it and also inform them about resources available to obtain support (<http://www.rosaslynncarter.org>). Although many caregivers may not be able to attend

support groups, providing them with reliable websites or community resources may be alternative ways for them to obtain support. Tailored information to address the unique needs of caregivers at the individual level may help caregivers cope and possibly increase positive adaptation to the caregiving experience. Providing information has been linked with reduction in uncertainty (Northouse, et al., 2002). Research suggests that uncertainty is the primary contributor to the stress associated with caregiving, with caregivers experiencing more uncertainty than the patients (Hinds, 1995, Northouse, et al., 2002). Interventions for family caregivers of cancer patients have successfully addressed some common symptoms through skills training and therapeutic counseling (Northouse, Katapodi, Song, Zhang, & Mood, 2010). However, few (if any) interventions address mental fatigue among family caregivers of cancer patients.

There are a number of ways that health professionals can help caregivers' mental fatigue by using restorative activities and attending to conservation of attention. For example, Tennessen and Cimprich (1995) studied restoration of directed attention among college students. The students with views to nature had better performance on attentional measures compared to the student with views to a city landscape. Encouraging caregivers to spend time in nature or viewing pictures of nature may help them restore their directed attention. In addition, caregivers can be encouraged to try to conserve their directed attention by minimizing excess noise and distractions in their environment, decreasing time constraints, streamlining large tasks into smaller objectives and providing structure to daily routines (Cimprich, 1995). These are some of the strategies that health professionals can use in clinical practice to help caregivers manage mental fatigue.

Limitations

The generalizability of this study is limited by the qualitative, cross sectional design with a convenience sample. However a qualitative design does provide rich data that can be used to further understand the mental fatigue experienced by family caregivers of cancer patients in a Phase I clinical trial. Reports of mental fatigue among family caregivers reflect the caregivers' subjective perceptions of their caregiving experience. Further research is needed to compare subjective and objective indicators of quality of care in the home. Although caregivers' perceived that their caregiving was above average, further research is needed to determine if their perceptions are associated with high quality of care delivery in their homes. Another limitation was that most caregivers were Caucasian, college educated, and middle aged female spouses, therefore these findings cannot be generalized to caregivers with different demographic or cultural characteristics.

In summary, there are multiple demands on the family caregiver's capacity to direct attention. The caregivers place primacy on their role to the point of foregoing their own medical attention at a cost to their mental and physical well-being. This finding highlights the need for clinicians to help caregivers manage mental fatigue. Helping caregivers to be effective in their role may prevent negative sequela to all involved.

Figure 3-1 Family Systems Model

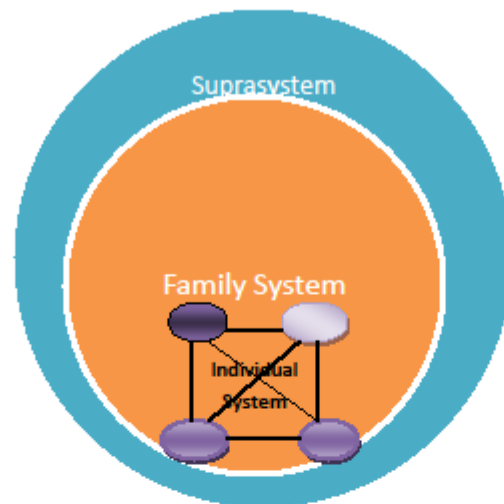


Figure 3-2. Qualitative Questions

1. What does mental fatigue mean for you?
2. Do you ever have trouble concentrating or remembering things? If so, can you give me an example of when this may have occurred?
3. Is mental fatigue interfering with your caregiver activities?
4. If so, how is mental fatigue interfering with your caregiver activities?
5. How does mental fatigue interfere with your ability to care for yourself?
6. Name a few distractions in your day to day life that may inhibit or get in the way of your ability to concentrate on activities that you want to do.
7. How would you rate the quality of care you are providing?
 - a. poor b. average c. above average d. excellent
8. How do you manage mental fatigue if you are experiencing it?
9. What kinds of things can the healthcare system do to decrease the mental fatigue in caregivers?
10. Is there anything more that you would like to tell me about your experience as a caregiver?

Table3- 1. Demographic Data

Characteristic	<u>X</u>	<u>SD</u>
Age (years, N=77)	54.75	14.282
Characteristic	n	%
Gender (N=79)		
Female	50	63.3
Ethnicity (N=78)		
Caucasian	65	83.3
African American	8	10.3
Other	5	6.4
Education (N=79)		
College	43	54.4
High School	28	37.3
Relationship to patient (N=79)		
Spouse	46	58.2
Daughter/son	10	12.7
Other relative	10	12.7
Friend	7	8.9
Sibling	6	7.6
Work (N=77)		
Presently working	37	48.1
Retired	29	37.7
Homemaker	7	9.1
Other	4	5.2
Comorbidities (N=77)		
Zero	32	41.6
One	20	26.0
Two	13	16.9
Three	7	9.1
Four	4	5.2
Six	1	1.3
Income (N=65)		
More than 75,000/year	25	38.5
50,001-75,000/year	16	24.6

Table3- 2. Themes

Caregiver's characterization of mental fatigue

- Definition of mental fatigue
- Problems with memory and concentration
- Effect on caregiving role
- Hindering ability to maintain own self-care

Ways caregivers' managed mental fatigue

- Self-care strategies
- Assistance they would like from health professionals

Benefits of caregiving

- Difficulty
- Benefit

References

- Baddeley, A. (2007). *Working memory, thought, and action*. New York, NY: Oxford University Press.
- Barkley, R. A. (1996). Linkages between attention and executive function. In G.R. Lyon & N. A. Krasnegor (Eds.), *Attention, memory, and executive function* (pp. 307-325). Baltimore, Maryland: Paul H. Brookes Publishing Co.
- Barsevick, A. M., Dudley, W., Beck, S., Sweeney, C., Whitmer, K., & Nail, L. (2004). A randomized clinical trial of energy conservation for patients with cancer-related fatigue. *Cancer, 100*(6), 1302-1310.
- Beesley, V. L., Price, M. A., & Webb, P. M. (2011). Loss of lifestyle: Health behaviour and weight changes after becoming a caregiver of a family member diagnosed with ovarian cancer. *Support Care Cancer, 19*, 1949-1956.
- Cimprich, B. (1992). Attentional fatigue following breast cancer surgery. *Research in Nursing and Health, 15*, 199-207.
- Cimprich, B. (1993). Development of an intervention to restore attention in cancer patients. *Cancer Nursing, 16*(2), 83-92.
- Cimprich, B. (1995). Symptom management: Loss of concentration. *Seminars in oncology Nursing, 11*(4), 279-288.
- Given, B. A., & Given, C. W. (1991). Family caregiver for the elderly. *Annual Review for Nursing Research, 0*, 77-101.

- Given, B., Wyatt, G., Given, C., Sherwood, P., Gift, A., Devoss, D., Rahbar, M. (2004). Burden and depression among caregivers of patients with cancer at the end of life. *Oncology Nursing Forum*, 31(6), 1105-1115.
- Hasson-Ohayon, I., Goldzweig, G., Braun, M., & Galinsky, D. (2010). Women with advanced breast cancer and their spouses: Diversity of support and psychological distress. *Psycho-Oncology*, 19(11), 1195-1204.
- Hinds, C. (1985). The needs of families who care for patients with cancer at home: are we meeting them? *Journal of Advanced Nursing*, 10(6), 575.
- Iconomou, G., Vagenakis, A. G., & Kalofonos, H. P. (2001). The informational needs, satisfaction with communication, and psychological status of primary caregivers of cancer patients receiving chemotherapy. *Support Care Cancer*, 9, 591-596.
- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. New York, NY: Cambridge University Press.
- Kaplan, S. (1995). The restorative benefits of nature: Towards an integrative framework. *Journal of Environmental Psychology*, 15, 169-182.
- Kaplan, S. (2001). Meditation, restoration and the management of mental fatigue. *Environment and Behavior*, 33(4), 480.
- Kaplan, S., & Kaplan, R. (1982). *Cognition and environment: Functioning in an uncertain world*. Belmont, CA: Praeger Publishers.
- Kurtz, M. E., Kurtz, J. C., Given, C. W., & Given, B. (1995). Relationship of caregiver reactions and depression to cancer patients' symptoms, functional states and depression: A longitudinal view. *Social Science and Medicine*, 40(6), 837-847.

- Lee, S., Kawachi, I., & Grodstein, F. (2004). Does caregiving stress affect cognitive function in older women? *The Journal of Nervous and Mental Disease*, 192(1), 51-57.
- Lorusso, P. M., Boerner, S. A., & Swymour, L. (2010). An overview of optimal planning, design, and conduct of phase I studies of new therapeutics. *Clinical Cancer Research*, 16(6), 1710-1718.
- Mackenzie, C. S., Smith, M. C., Hasher, L., Leach, L., & Behl, P. (2007). Cognitive functioning under stress: Evidence from informal caregivers of palliative patients. *Journal of Palliative Medicine*, 10(3), 749-758.
- McEwen, B. S., & Magarinos, A. M. (1997). Stress effects on morphology and function of the hippocampus. *Annals of the New York Academy of Sciences*, 821, 271-284.
- McEwen, B. S., & Sapolsky, R. M. (1995). Stress and cognitive function. *Current Opinion in Neurobiology*, 5, 205-216.
- Morris, G. A. (1996). Relationships and distinctions among the concepts of attention, memory, and executive function: A developmental perspective. In G.R. Lyon & N.A. Krasnegor (Eds.), *Attention, memory, and executive function* (pp. 11-16). Baltimore, MD: Paul H. Brookes Publishing Co.
- Nijboer, C., Tempelaar, R., Triemstra, M., van den Bos, G. A., & Sanderman, R. (2001). The role of social and psychologic resources in caregivers of cancer patients. *Cancer*, 91(5), 1029-1039.
- Northouse, L. L., Dorris, G., & Charron-Moore, C. (1995). Factors affecting couples' adjustment to breast cancer. *Social Science and Medicine*, 41(1), 69-76.

- Northouse, L. L., Katapodi, M. C., Song, L., Zhang, L., & Mood, D. W. (2010). Interventions with family caregivers of cancer patients: Meta-analysis of randomized trials. *CA: A Cancer Journal for Clinicians*, 60(5), 317-339.
- Northouse, L. L., Mood, D., Kershaw, T., Schafenacker, A., Mellon, S., Walker, J.,...Decker, V. (2002). Quality of life of women with recurrent breast cancer and their family members. *Journal of Clinical oncology*, 20(19), 4050-4064.
- Posner, M. L., & Snyder, C. R. (1975). Facilitation and inhibition in the processing of signals. In P.M.A. Rabbit & S. Dornic (Eds.), *Attention and performance V* (pp. 669-682). New York, NY: Academic Press.
- Schulz, R., & Beach, S. R. (1999). Caregiving as a risk factor for mortality: the caregiver health effects study. *Journal of the American Medical Association*, 282(23), 2215-2219.
- Schulz, R., & Sherwood, P. R. (2008). Physical and mental health effects of family caregiving. *American Journal of Nursing*, 108(9), 23-27.
- Stenberg, U., Ruland, C. M., & Miaskowski, C. (2009). Review of the literature on the effects of caring for a patient with cancer. *Psycho-Oncology*, 19(10), 1013-1025.
- Weitzner, M. A., Meyers, C. A., Steinbruecker, S., Saleeba, A. K., & Sandifer, S. D. (1997). Developing a caregiver quality of life instrument: Preliminary steps. *Health Care for Women International*, 24, 280-291.
- Wright, L. M. & Leahey, M. (1994). *Nurses and families: A guide to family assessment and intervention* (2nd ed.). Philadelphia, PA: F. A. Davis

Chapter IV
Factors Associated with Mental Fatigue in Family Caregivers of Oncology Patients
on Phase I Clinical Trials

Introduction

The projected 2013 death rate in the United States from metastatic cancer is more than half a million a year (Siegel, Naishadham, & Jemal, 2013). To improve survival rates, the National Cancer Institute has declared new drug development a national priority (National Cancer Institute, 2012). Phase I clinical trials are the cornerstone to new drug development. Designed to assess safety of the new drug, these studies are offered to patients with few remaining options in the treatment of their cancer (Lorusso, Boerner, & Seymour, 2010). Patients typically enter these studies heavily pretreated with cumulative side effects from previous therapies, and most likely have other comorbid conditions. Being on a Phase I clinical trial demands time and attention from the patients and their family caregivers due to the intricate requirements of the study and careful monitoring necessary for patients. Providing informal care to patients participating in Phase I clinical trials further complicates the difficult task of caregiving. The ability of family caregivers to maintain focus and attention during provision of care is of paramount importance.

Caregiving is a complex task. It involves making and carrying out goals, activities and self-monitoring of performance. These caregiving components require use of higher level cognitive processes known as executive function (Lezak, 1982). Executive function

requires working memory and directed attention in order to focus on relevant information while inhibiting irrelevant stimuli in order to plan, monitor, and code representations in working memory (Smith & Jonides, 1999). Directed attention is the interface between environmental (internal or external) events and the behavior (physical or conceptual) of the individual (Barkley, 1996). Directed attention is driven by individuals' intentions, which enable them to focus on important information while inhibiting competing stimuli. The neural inhibitory function of directed attention is essential in other aspects of cognitive function and behavior, such as working memory and executive function (Smith & Jonides, 1999). When cognitive demands increase, more mental effort is needed to execute activities. Unfortunately attention and working memory have a limited capacity. The over exertion of cognitive energy to inhibit distractions may lead to mental fatigue and deficits in working memory. As a result, mental fatigue may compromise the caregivers' ability to effectively deal with challenges in their role (Cimprich, 1993)

Mental fatigue in caregivers of cancer patients has received little attention. The few studies that have assessed cognitive function have been with caregivers of patients with Alzheimer's disease (Caswell et al., 2003; Vitaliano et al., 2005; Vitaliano et al., 2009), patients in palliative care (Mackenzie, Smith, Hasher, Leach, & Behl, 2007), and elderly caregivers (Lee, Kawachi, & Grodstein, 2009). Findings from these studies indicate that caregivers have lower scores than non-caregivers on objective measures of cognitive function (Caswell et al., 2003), verbal knowledge (Vitaliano et al., 2005), directed attention and recall (Mackenzie et al.) with an ongoing cognitive decline when assessed over two years. Since caregivers in these studies did not differ from non-

caregivers on age, education, and health status, the lower cognitive function in caregivers has been attributed to the stress associated with their caregiving role (Vitaliano et al., 2009) Most of these studies were with caregivers of patients with Alzheimer's disease, and as a result, little is known about cognitive problems in caregivers of patients facing advanced cancer. More research is needed to determine if mental fatigue exists in caregivers of advanced cancer patients and to determine what factors are associated with the cognitive problems that they report. In order to gain a greater understanding of family caregivers of cancer patients on Phase I trials, this study examined mental fatigue and factors associated with it in family caregivers of cancer patients participating in Phase I clinical trials.

Theoretical Framework

Two conceptual models were used for this study. The first model was derived from The Family Systems Theory (Figure 4-1). As an illness affects the patient, family members are affected and attempt to balance the change (Wright & Leahey, 1994). Lazarus and Folkman's Theory of Stress and Coping (1984) is the second model guiding this research. According to the model, antecedent factors such as characteristics of the caregiver and their current levels of social support affect caregivers' appraisal of their caregiving experience and coping resources; these factors subsequently can affect caregivers' level of cognitive function (mental fatigue) (see Figure 4-2). This model also illustrates that appraisal and coping may mediate the relationship between the antecedent variables and dependent variable, i.e. mental fatigue.

Antecedent factors. As illustrated in the model, person factors such as the caregivers' age can affect their appraisal of caregiving. Younger caregivers may view caregiving more negatively than older ones (Dumont et al., 2006; Given et al. 2004; Nijboer et al., 2000) because of other work and family demands they face in addition to their caregiving role. Social factors such as social support, has been related to more positive appraisal of caregiving (Northouse & McCorkle, 2010).

Appraisal factors. Appraisal refers to how individuals perceive and form the meaning of a stressor. This judgment shapes and builds their emotional and behavioral responses to the stimulus (Lazarus & Folkman, 1984). Researchers have found that caregiver *burden* is positively associated with more symptoms of depression and anxiety and with greater deterioration in caregivers' depression scores over time (Grov, Fossa, Sorebo, & Dahl, 2006; Phillips, Gallagher, Hunt, Der, and Carroll, 2009). As caregivers spend more time in the caregiver role, their perception of their own health can decrease (Chang, Chiou, & Chem, 2010), and add to caregivers' worry and irritation (Given et al., 2004). According to the model, caregivers' coping strategies are influenced by the appraisal of caregiving.

Coping is a cognitive and behavioral response used to manage demands that people appraise as stressful (Lazarus, 1999). There are different kinds of coping-active and avoidant. Avoidant coping strategies (i.e., escaping, self-blame) are associated with greater distress and poorer quality of life, while active coping strategies (i.e., problem solving, reframing, planning) are associated with less distress (Kershaw, Northouse, Kritpracha, Schafenacker, & Mood, 2004; Ben-Zur, 2001). Furthermore, greater use of

avoidant coping by caregivers has been associated with worsening symptom distress in patients (Kershaw et al., 2004). Although research indicates that caregivers have a better mental quality of life if they use less avoidant coping (Kershaw et al., 2008), the relationship between coping and mental fatigue has not been examined.

Mental Fatigue is the outcome of prolonged un-rested mental energy (Kaplan, 2001). The caregiver literature identifies burden as a sequel of caregiving, yet little is known about how the demands of caregiving affect caregivers' level of mental fatigue. Determining the presence of mental fatigue in this unique group, and identifying the existence of factors associated with it is imperative in order to help caregivers manage mental fatigue as the caregiving population continues to grow and incorporates older caregivers.

In summary, mental fatigue is a problem for caregivers of patients with chronic illness. However, little is known about mental fatigue in caregivers of cancer patients and factors associated with it. Guided by stress-coping theory, the two aims for this study are to: 1) to describe the level of mental fatigue in caregivers of cancer patients in Phase I trials, and 2) examine the relationship between antecedent factors (social support), appraisal (burden), coping (active and avoidant) and the dependent variable mental fatigue.

Methods

Design

The study used an exploratory cross-sectional design and focused on caregivers of patients in Phase I trials. Demographic and descriptive data was obtained from patients' medical records to control for their possible influence on caregivers' mental fatigue.

Sample and Setting

The sample was drawn from the Phase I Cancer Program at a comprehensive cancer center in the Midwest. Caregivers were eligible to participate in the study if they met the following inclusion criteria: being 18 years or older, identified by patients as their primary caregiver (i.e., provider of emotional and/or physical care), cognitively intact (score > 24 on the Mini Mental State Exam), and had sufficient command of the English language. Patients had to be 18 years or older, enrolled or in the process of enrolling into a Phase I clinical trial, and have sufficient command of the English language to complete the study questionnaire. Caregivers were excluded if they were cognitively impaired (score < 24 on the mini Mental State Exam).

A total of 85 patient/caregiver dyads met the eligibility criteria. Of these, 79 dyads completed the questionnaires (enrollment rate 93%). Three patients were not interested in participating, two caregivers were unable to consent due to travel distance and work obligations, and one caregiver declined stating that the questionnaire was too involved.

Study Procedures

The institutional review board of the health system and corresponding universities, Wayne State University and the University of Michigan, approved the study. Caregivers were approached by a research assistant and asked to participate in the study. Written informed consent was obtained from all study participants. Following consent, caregivers completed the Mini Mental State Exam (MMSE) in order to exclude participants with pre-existing cognitive dysfunction. If caregivers scored ≥ 24 on the MMSE they were eligible to complete the study questionnaire. Caregivers filled out the questionnaires in the clinic or at home and returned them in person. Three caregivers returned the questionnaires via mail.

Measures

Cognitive Function Screen

The *Mini-Mental State Exam (MMSE)* was used to screen for cognitive function problems and ensure that caregivers in the study had intact cognitive function. The MMSE has been found to be an acceptable cognitive screening measure in research examining cognition in healthy individuals and cancer patients (Folstein, Folstein, & McHugh, 1975). This standardized test is brief and includes 11 questions to assess orientation, memory, attention, and language (Folstein et al.). The test took approximately 5 minutes to complete and was scored from 0-30. A score of ≥ 24 indicated no serious cognitive impairment (Lezak, 2004).

Antecedent Variables

Demographic information was obtained with a researcher-developed questionnaire and review of the patients' medical chart in order to describe the sample population. Demographic variables included caregivers' 1) age, 2) race, 3) ethnicity, 4) marital status, 5) relationship to caregiver, 6) education level, 7) employment status, and 9) level of income. Patient medical information was obtained from a chart review and consisted of type of cancer, current treatment and performance status.

The *Personal Resource Questionnaire (PRQ)* was used to measure caregivers' perceived social support (Brandt & Weinert, 1981). The instrument consisted of 15 items rated on a 7-point Likert scale with higher scores indicating more social support. In a recent study, a reliability coefficient indicated that the scale had adequate internal consistency ($\alpha = .90$) (Song et al., 2011). Predictive validity coefficients were .30-.44 ($p < .001$) (Brandt & Weinert). In this study, the Cronbach alpha was .89.

Appraisal

The *Caregiver Reaction Assessment (CRA)* was used to assess the caregiver's level of burden (Given et al., 1992). This is a multidimensional tool designed to assess the differences in reactions of caregivers to their caregiving role and changes in reaction over time. The measure consisted of 24-items with 5 subscales (effect of caregiving on self-esteem, level of family support, impact on finances, impact on schedule, and impact on health). Answers are rated on a 5-point Likert scale. The scoring of positively worded sentences was reversed such that higher scores indicated more negative impact of caregiving. The psychometrics reported on this instrument list Cronbach's alpha greater

than 0.80 on all five subscales (Given et al., 1992). In this study, the Cronbach alpha was .79.

Coping

Coping was evaluated with Brief Cope, a 28-item instrument with 14 factors, with each factor consisting of 2 items (Carver, 1997). The participants are asked to rate the coping strategies they use on a 4-point Likert scale with response options ranging from not at all to a lot. High scores on active coping items indicates strong active coping, while high scores on avoidant coping items designate more avoidant coping. Concurrent validity for the Brief Cope was assessed with selected subscales of the Profile of Mood States (POMS) and positive, significant relationships were found ($r = .46-.64$) (Fillion, Kovacs, Gagnon, & Endler, 2002).

In a prior study the scale was factor analyzed into two major components, active coping and avoidant coping (Kershaw et al., 2004). In that study, alpha reliability coefficients for caregivers of cancer patients was 0.79 for both the active and avoidant coping factors (Kershaw et al., 2004). In the present study *avoidant coping* factor consisted of the denial, alcohol/drug use, behavior disengagement, and venting subscales and the alpha reliability coefficient was 0.70. The *active coping* factor consisted of the emotional support, positive reframing, active coping, planning and acceptance subscales and the alpha reliability coefficient was 0.76.

Dependent Variable

The *Attentional Function Index (AFI)* was used to assess mental fatigue. This is a subjective measure of a person's perceived effectiveness in activities that require directed

attention (Cimprich, Visovatti, & Ronis, 2011). The AFI consists of 13 items anchored with opposite phrases from not at all (0) to extremely well or a great deal (10). A single overall score is compiled by computing the average of the items. Lower scores indicate greater mental fatigue. The AFI has correlated positively with objective measures of directed attention in healthy adults and had an internal consistency coefficient of 0.76 when administered to cancer patients (Cimprich) and 0.94 when administered to healthy adults (Cimprich). In this study, the Cronbach alpha was .91 for the scale.

Data Analysis

Descriptive statistics were used to describe the sample. A correlation matrix for study variables was examined (Table 4-3). Correlations for relationships in the model were statistically significant at $p = .05$ to $.10$. It was anticipated that covariance would occur between social support and burden. Path analysis using AMOS 20.0 was performed to test goodness of fit of the theoretical model with the data. The model was trimmed by deleting non-significant paths and was modified and retested until adequate fit indices were obtained.

Results

Sample Characteristics

The average age of family caregivers in this study was 54.8 years. The majority were female (63%), Caucasian (58%), and college educated (56%), with 39% reporting an annual household income greater than \$75,000. Just over half of the caregivers were spouses (58.2%) of the patient. Nearly half of the caregivers worked outside the home (48.1%) (Table 4-1).

Descriptive Findings

Mean scores, standard deviations and range on the major study variables are presented in Table 4-2. Path analysis was used to determine the relationship among study variables. The parsimonious model of the final data with significant or marginally significant variables is shown in Figure 4-1.

Model

Mental fatigue in caregivers is directly influenced by both avoidant coping and social support (see Figure 4-3). Higher avoidant coping is associated with higher mental fatigue. Higher social support is associated with lower mental fatigue. In addition to these two direct effects there were also three variables that had an indirect effect on mental fatigue. Social support had an indirect effect on mental fatigue through burden and avoidant coping. In other words, higher support led to less caregiver burden, less avoidant coping and lower mental fatigue. Caregiver burden also had an indirect effect on mental fatigue through avoidant coping. Finally, age had an indirect effect through burden and avoidant coping. More specifically, younger caregivers experienced more burden than older caregivers and they used more avoidant coping, which lead to higher mental fatigue. The model fit the data well, resulting in a goodness-of-fit chi-square 9.540, df 13, ($p=.731$), CFI 1.00, $cmin/df$.734, RMSEA= .000. This model explained 18% of the variance of mental fatigue, 10% of avoidant coping and 27% of burden.

Discussion

One of the important findings of this study is that caregivers of cancer patients enrolled in Phase I trials have high levels of mental fatigue- that exceed the levels

reported for other cancer patients and the cancer-free population (Table 4-4). Prior studies have identified reduced cognitive function in caregivers of patients with other chronic illnesses such as Alzheimer's disease. This study extends those findings to caregivers of cancer patients and indicates that mental fatigue is a significant problem for them as well. The attentional demands inherent in the family caregiver are inevitable due to the nature of the role. The effects of mental fatigue on the caregiver may potentially lead to serious consequence for the caregiver and care recipient as problem solving and decision making are affected.

The theoretical model guided the selection of variables examined in this study and accounted for a significant amount of variance in mental fatigue. Social support was a key variable in the model because it had both a direct and indirect effect on mental fatigue. Since prior research indicates that support from friends often decreases even though the demands of caregiving increase during advanced cancer (Kurtz, Given, Kurtz, & Given, 1994) social support may be a very important resource to caregivers of patients in Phase I trials. Social support had a direct effect on lowering mental fatigue possibly because sharing concerns with a supportive person enables caregivers to release pent up worries and concerns. This may help caregivers to put their concerns in perspective and allow distracting thoughts to recede resulting in less mental fatigue. A study on newly diagnosed breast cancer patients demonstrated that high levels of anxiety were associated with patients' poor perception on their mental performance (Lehto & Cimprich, 1999). This finding was attributed to the demand anxiety has on attentional resources. Prolonged or intense mental demands manifest as losses in cognitive function and are associated

with mental fatigue (Kaplan, 1995). Social support also had an indirect path to mental fatigue. Caregivers with higher levels of support had more supportive resources available to them which could have lessened their caregiver burden, decreased their use of avoidant coping and lessen their mental fatigue.

Caregiver burden had an indirect effect on mental fatigue. The domain of burden that had the greatest impact on mental fatigue was the extent to which caregiving had a negative impact on the caregiver's schedule. This finding is in keeping with research by other investigators who also found that impact on schedule was a key subscale for understanding caregiver burden (Kurtz, Kurtz, Given, & Given, 2004; Jensen & Given, 1993; Nijboer, Triemstra, Tempelaar, Sanderman, & van den Bos, 1999). Providing care places demands on caregivers' schedules as they try to accommodate appointments and unexpected events that can disrupts caregivers' routines. Tending to disruptions may place added strain on the caregiver's capacity to carry out their role (Kurtz et al.). Surprisingly, burden did not have a direct path to mental fatigue. Instead, higher caregiver burden lead to greater use of avoidant coping and higher mental fatigue. Some researchers contend that caregivers may use avoidant coping as patients symptoms worsen to protect themselves from the suffering they see in the patient (Kershaw et al., 2004). Caregivers may also use avoidant coping to prevent themselves from being overwhelmed as caregiving demands increase.

An important finding from this study was that greater use of avoidant coping led to higher mental fatigue. In two longitudinal studies of cancer patients, researchers found that caregivers who used more avoidant coping had lower mental quality of life (Kershaw

et al., 2004; Kershaw et al., 2008). Interestingly, the use of avoidant coping was strongest when patient symptoms increased. This may be of particular concern for caregivers of patients enrolled in Phase I trials as these patients typically are in advanced stages of their disease. Research indicates that avoidant coping is problematic for caregivers. Avoidant coping has been associated with poor mental quality of life in caregivers in prior studies, and is associated with greater mental fatigue for caregivers in this study. As mental energy is used to avoid the uncomfortable stimulus (i.e., worry or concerns about the patient), less energy is available to attend to the demands at hand resulting in mental fatigue.

Social support scores obtained in this study were comparable to the scores obtained for family caregivers of prostate cancer patients in a prior study (Kershaw et al., 2008). Caregivers in the present study had significantly higher mean scores on caregiver esteem, significantly lower mean scores on impact on schedule, health, finances and support when compared to caregivers of terminally ill patients (Brazil, Bedard, Willison, & Hode, 2003). This may be due to Phase I clinical trials being an active form of treatment and not considered palliative in nature. Caregivers' active and avoidant coping scores were significantly higher compared to family caregivers of recurrent breast cancer patients (Kershaw, Northouse, Kritpracha, Schafenacker, & Mood, 2004). Further evaluation and comparison of demographic data is needed. Finally, the caregivers' mean score for mental fatigue was lower (i.e., worse) than the mean score reported for the normal population (8.09) (Kirvan Visovatti 2013) and for a sample of colorectal cancer patients (7.07) (Kirvan Visovatti).

Age had an indirect effect on mental fatigue through a negative association with burden and positive association with avoidant coping. Older caregivers perceived less burden in particular less impact on their day-to-day schedule, most likely because they have less demands on their schedule in comparison to younger caregivers. (Dumont et al., 2006; Given et al., 2004; Nijboer et al., 2000). Younger caregivers may have greater time restriction in light of the demands of work, family life and social activities while trying to incorporate caregiving into the regimen. These added attentional demands placed on younger caregivers put them at an increased risk for more mental fatigue. Research also suggests that younger caregivers report higher levels of psychological distress compared to older caregivers (Montgomery, Gonyea, & Hooyman, 1985; Mor, Allen, & Malin, 1994) as well as higher emotional fatigue (Gaugler et al., 2005).

Nursing Implications

This study provides preliminary evidence that caregivers of cancer patients in Phase I studies are vulnerable to mental fatigue. Nurses need to be aware of the demands we place on caregivers, who often are asked to take on more and more professional care roles. As we put more demands on caregivers, with limited coping resources, they are at risk for higher mental fatigue. Health professionals need to assess for signs of mental fatigue in caregivers (i.e., irritability, difficulty concentrating), especially in younger caregivers, caregivers who have multiple demands on their day to day schedule, or who are relying on avoidant coping strategies because they are at higher risk of developing mental fatigue. Nurses also need to assess their sources of support, since it has significant direct and indirect effect on caregivers' mental fatigue.

Specific ways of managing mental fatigue have been reported in the literature for patients and may be useful for caregivers. Research suggests changing tasks or recognizing supportive environments in order to restore mental energy required for directed attention (Kaplan, 2001). Programs of care need to be offered to family caregivers to help improve their mental capacity and quality of life.

Limitations

Limitations of the study include a cross-sectional design, although it is useful for describing an understudied population, cannot determine causality. Longitudinal studies need to be conducted to determine how mental fatigue in family caregivers of cancer patients enrolled in Phase I trials change over time. The number of caregivers from minority ethnic/cultural background in this sample was low, limiting generalizability. Future studies need to include a more culturally diverse sample as health care disparities related to ethnicity may lead to different levels of mental fatigue. This study utilized one subjective measure for examining mental fatigue. Further studies are needed to include objective measures of directed attention. Finally, the research participants were derived from a convenience sample.

Conclusion

The ability to concentrate is essential to purposeful activity especially while providing care during times of high demands on directed attention. Family caregivers of cancer patients participating in Phase I clinical trials on average perceived moderate levels of mental fatigue, and likely had difficulty processing information, learning new skills, making decisions, and moderating their behavior. Nurses and health care providers

need to be aware of the challenges family caregivers face and optimize the clinic or hospital visits by simplifying and reinforcing pertinent information, and limiting environmental distractions.

Figure 4-1 Family Systems Model

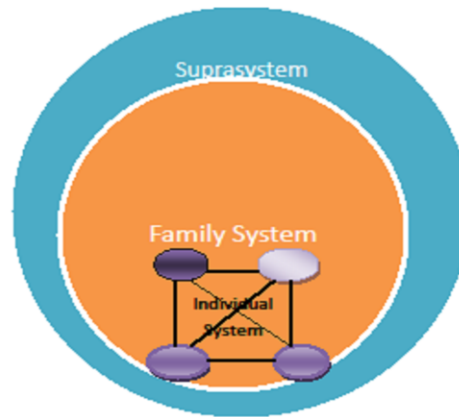


Figure 4-2 Theoretical Framework

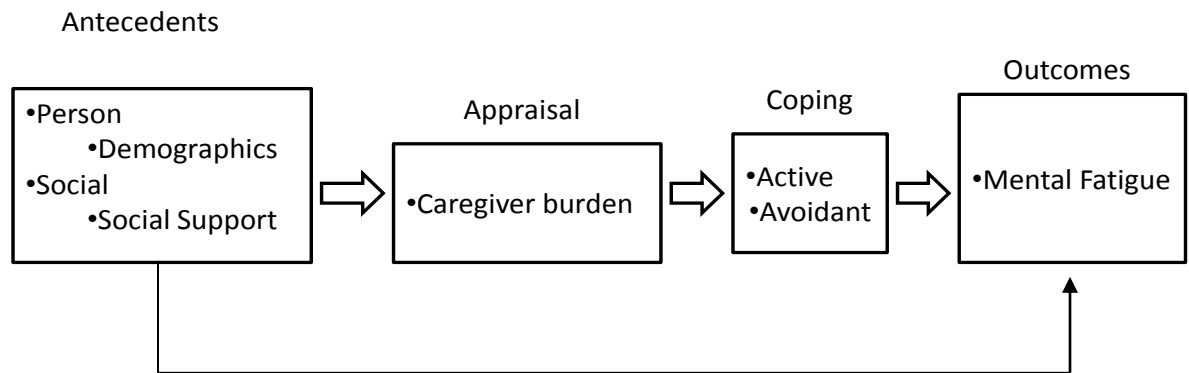
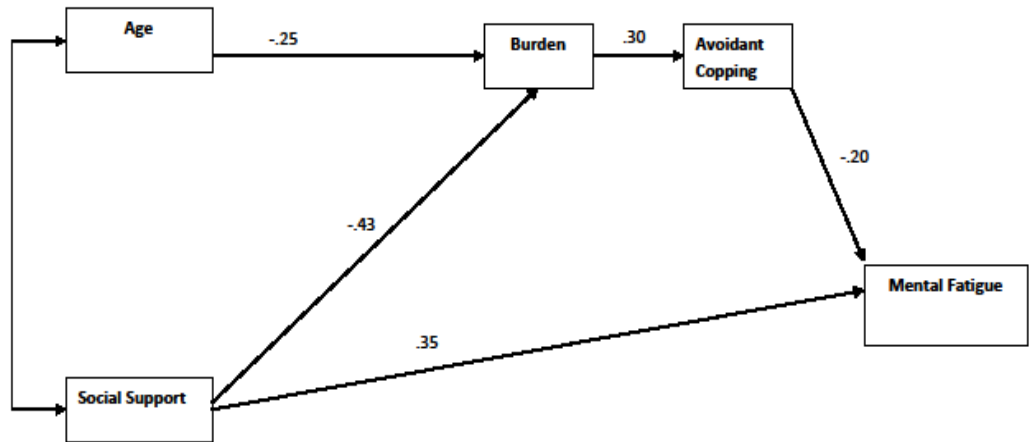


Figure 4.3 Model With Standardized Regression Weights



*Lower scores on AFI indicate more mental fatigue

Table 4.1 Demographic Data

Characteristic	<u>X</u>	<u>SD</u>
Age (years, N=77)	54.75	14.28
Characteristic	n	%
Gender		
Female	50	63.3
Ethnicity (N=78)		
Caucasian	65	83.3
African American	8	10.3
Other	5	6.4
Education (N=79)		
College	43	54.4
High School	28	37.3
Relationship to patient (N=79)		
Spouse	46	58.2
Daughter/son	10	12.7
Other relative	10	12.7
Friend	7	8.9
Sibling	6	7.6
Work (N=77)		
Presently working	37	48.1
Retired	29	37.7
Homemaker	7	9.1
Other	4	5.2
Comorbidities (N=77)		
Zero	32	41.6
One	20	26.0
Two	13	16.9
Three	7	9.1
Four	4	5.2
Six	1	1.3
Income (N=65)		
More than 75,000/year	25	38.5
50,001-75,000/year	16	24.6

Table 4.2 Instruments

Measure	Range (min/max)	Mean (sd)	Cronbach's Alpha	One Sample T	Comparative Mean	Sig
PRQ	63.0 (41-104)	83.9 (15.2)	.89	-.61	85.0 *	.544
CRA						
Esteem	16 (19/35)	29.9 (3.9)		29.1	16.9 §	.000
Support	16(5/21)	10.1 (4.1)		-3.2	11.6 §	.002
Finance	11 (3/14)	7.1 (3.0)		-2.0	7.84 §	.048
Schedule	20 (5/20)	15.2 (4.0)		-5.7	17.8 §	.000
Health	12 (4/16)	8.36 (2.7)		-17.9	13.7 §	.000
COPE						
Active	27 (19/46)	32.7 (5.9)	.76	7.5	27.6 †	.001
Avoid	22 (10/32)	14.7 (3.6)	.70	8.7	11.0 †	.000
AFI	6.6 (2.6/9.2)	6.5 (1.6)	.91	-3.14	7.07 ‡	.002

* Sample of 121 prostate cancer dyads (Kershaw et al., 2008)

§ Sample of 151 family caregivers of terminally ill patients (Brazil et al., 2003)

† Sample of 134 family caregivers of recurrent breast cancer patients (Kershaw et al., 2004)

‡ Sample of 50 colorectal cancer patients (Kirvan Visovatti, 2013)

Table 4.3 Correlations

Correlations							
		Age	Social Support	Burden/ Schedule	Active Coping	Avoidant Coping	Mental Fatigue
Age	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	156					
Social Support	Pearson Correlation	.113	1				
	Sig. (2-tailed)	.347					
	N	72	73				
Burden/ Schedule	Pearson Correlation	-.142	-.344**	1			
	Sig. (2-tailed)	.230	.004				
	N	73	69	74			
Active Coping	Pearson Correlation	-.238*	.410**	.036	1		
	Sig. (2-tailed)	.038	.000	.760			
	N	76	72	73	78		
Avoidant Coping	Pearson Correlation	-.241*	-.072	.315**	.067	1	
	Sig. (2-tailed)	.038	.549	.007	.563		
	N	75	71	72	76	77	
Mental Fatigue	Pearson Correlation	.090	.359**	-.282*	.281*	-.225	1
	Sig. (2-tailed)	.441	.002	.016	.013	.051	
	N	76	72	73	77	76	78
*. Correlation is significant at the 0.05 level (2-tailed).							
**. Correlation is significant at the 0.01 level (2-tailed).							

Lower AFI score indicates more mental fatigue

Table 4-4 Descriptive Data on Mental Fatigue

Phase I Mean	SD	Alpha	One Sample T	Comparative Mean	Sig
6.49	1.62	.91	-3.14	7.07*	.002
			-8.68	8.09†	.001

*Colorectal cancer patients

†Benign colorectal cancer screening population

Lower scores indicate worse mental fatigue

References

- Barkley, R. A. (1996). Linkages between attention and executive function. In G. R. Lyon & N. A. Krasnegor (Eds.), *Attention, memory, and executive function* (pp. 307-325). Baltimore, Maryland: Paul H. Brookes Publishing Co.
- Ben-Zur, H. (2001). Your coping strategies and my distress: Inter-spouse perceptions of coping and adjustment among breast cancer patients and their spouses. *Families, Systems, & Health, 19*(1), 83-94.
- Brandt, P. A., & Weinert, C. (1981). The PRQ-A social support measure. *Nursing Research, 30*(5), 277-280.
- Brazil, K., Bedard, M., Willison, K., & Hode, M. (2003). Caregiving and its impact on families of the terminally ill. *Aging and Mental Health, 7*(5), 376-382.
- Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the brief COPE. *Int J Behav Med, 4*, 220-233.
- Caswell, L. W., Vitaliano, P. P., Croyle, K. L., Scanlan, J. M., Zhang, J., & Daruwala, A. (2003). Negative associations of chronic stress and cognitive performance in older adult spouse caregivers. *Experimental Aging Research, 29*, 303-318.
- Chang, H-Y, Chiou, C-J, & Chem, N-S (2010). Impact of mental health and caregiver burden on family caregivers' physical health. *Archives of Gerontology and Geriatrics, 50*, 267-271.

- Cimprich, B. (1993). Development of an intervention to restore attention in cancer patients. *Cancer Nursing* 16(2), 83-92.
- Cimprich, B., Visovatti, M., & Ronis, D. L. (2011). The attentional function index: A self-report cognitive measure. *Psycho-Oncology*, 20(2), 194-202.
- Dumont, S., Turgeon, J., Allard, P., Gagnon, P., Charbonneau, C., & Vezina, L. (2006). Caring for a loved one with advanced cancer: Determinants of psychological distress in family caregivers. *Journal of Palliative Medicine*, 9(4), 912-921.
- Fillion, L., Kovacs, A. H., Gagnon, P., & Endler, N. S. (2002). Validation of the shortened COPE for use with breast cancer patients undergoing radiation therapy. *Current Psychology* 21(1), 17-34.
- Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). Mini-mental state: A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, 12, 189-198.
- Gaugler, J. E., Hanna, N., Linder, J., Given, C. W., Tolbert, V., Kataria, R., Regine, W. F. (2005). Cancer caregiving and subjective stress: A multi-site, multi-dimensional analysis. *Psycho-Oncology*, 14, 771-785.
- Given, B., Wyatt, G., Given, C., Sherwood, P., Gift, A., Devoss, D., Rahbar, M. (2004). Burden and depression among caregivers of patients with cancer at the end of life. *Oncology Nursing Forum*, 31(6), 1105-1115.
- Given, C. W., Given, B., Stommel, M., Collins, C., King, S., & Franklin, S. (1992). The caregiver reaction assessment (CRA) for caregivers to persons with chronic physical and mental impairments. *Research in Nursing and Health*, 15, 271-283.

- Grov, E. K., Fossa, S. D., Sorebo, P., & Dahl, A. A. (2006). Primary caregivers of cancer patients in palliative phase: A path analysis of variable influencing their burden. *Social Science and Medicine*, 63, 2429-2439.
- Jensen, S., & Given, B. (1993). Fatigue affecting family caregivers of cancer patients. *Support Care Cancer*, 1, 321-325.
- Juarez, G., Ferrell, B., Uman, G., Podnos, Y., & Wagman, L. (2008). Distress and quality of life concerns of family caregivers of patients undergoing palliative surgery. *Cancer Nursing*, 31(1), 2-10.
- Kaplan, S. (1995). The restorative benefits of nature: Towards an integrative framework. *Journal of Environmental Psychology*, 15, 169-182.
- Kaplan, S. (2001). Meditation, restoration and the management of mental fatigue. *Environment and Behavior*, 33(4), 480.
- Kershaw, T., Northouse, L., Kritpracha, C., Schafenacker, A., & Mood, D. (2004). Coping strategies and quality of life in women with advance breast cancer and their family caregivers. *Psychology and Health*, 19(2), 139-155.
- Kershaw, T. S., Mood, D. W., Newth, G., Ronis, D. L., Sanda, M. G., Vaishampayan, U., Northouse, L. L. (2008). Longitudinal analysis of a model to predict quality of life in prostate cancer patients and their spouses. *Annals of Behavioral Medicine*, 36(2), 117-128.
- Kirvan Visovatti, M. (2013). Cognitive symptoms and immune responses in colorectal cancer. *Dissertation Abstracts International: Section A. Humanities and Social Sciences*,

- Kurtz, M. E., Given, B., Kurtz, J. C., & Given, C. W. (1994). The interaction of age, symptoms, and survival status on physical and mental health of patients with cancer and their families. *Cancer*, 74(S7), 2071-2078.
- Kurtz, M. E., Kurtz, J. C., Given, C. W., & Given, B. A. (2004). Depression and physical health among family caregivers of geriatric patients with cancer-a longitudinal view. *Med Sci Monit*, 10(8), CR447-456.
- Lazarus, R. S. (1999). *Stress and Emotion: A New Synthesis*. New York, NY: Springer.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, NY: Springer Publishing Company.
- Lee, S., Kawachi, I., & Grodstein, F. (2009). Does caregiving stress affect cognitive function in older women? *The Journal of Nervous and Mental Disease*, 192(1), 51-57.
- Lehto, R.H., & Cimprich, B. (1999). Anxiety and directed attention in women awaiting breast cancer surgery. *Oncology Nursing Forum*, 26(4), 767-772.
- Lezak, M. D. (1982). The problem of assessing executive functions. *International Journal of Psychology*, 17, 281-297.
- Lezak, M. D. (2004). *Neuropsychological Assessment*. New York, NY: Oxford University Press.
- Lorusso, P. M., Boerner, S. A., & Seymour, L. (2010). An overview of the optimal planning, design, and conduct of Phase I studies of new therapeutics. *Clinical Cancer Research*, 16(6), 1710.

- Mackenzie, C. S., Smith, M. C., Hasher, L., Leach, L., & Behl, P. (2007). Cognitive function under stress: Evidence from informal caregivers of palliative patients. *Journal of Palliative Medicine, 10*(3), 749-758.
- Montgomery, R. J., Gonyea, J. G., & Hooyman, N. R. (1985). Caregiving and the experience of subjective and objective burden. *Family Relations, 34*, 19-26.
- Mor, V., Allen, S., & Malin, M. (1994). The psychosocial impact of cancer on older versus younger patients and their families. *Cancer, 74*(7), 2118.
- National Cancer Institute. (2012). *NCI Vision and Priorities*. Retrieved October 17, 2013, from <http://www.cancer.gov>
- Newth, G. E. (2012). *The quality of life of men with advanced prostate cancer treated with androgen deprivation therapy and their partners*. (Dissertation). Retrieved from <http://hdl.handle.net/2027.42>
- Nijboer, C., Triemstra, M., Tempelaar, R., Mulder, M., Sanderman, R., & van den Bos, G. A. (2000). Patterns of caregiver experiences among partners of cancer patients. *The Gerontologist, 40*(6), 738-746.
- Nijboer, C., Triemstra, M., Tempelaar, R., Sanderman, R., & van den Bos, G. A. (1999). Determinants of caregiving experiences and mental health of partners of cancer patients. *Cancer, 86*(4), 576-588.
- Northouse, L. L., & McCorkle, R. (2010). Spouse caregivers of cancer patients. In J.C. Holland, W.S. Breitbart, P.B. Jacobsen, M.S. Lederberg, M.J. Loscalzo & R. McCorkle (Eds.), *Psycho-Oncology* (2nd ed., pp. 516-521). New York, New York: Oxford University Press.

- Phillips, A. C., Gallagher, S., Hunt, K., Der, G., & Carroll, D. (2009). Symptoms of depression in non-routine caregivers: the role of caregiver strain and burden. *British Journal of Clinical Psychology, 48*, 335-346.
- Siegel, R., Naishadham, D., & Jemal, A. (2013). Cancer statistics, 2013. *CA Cancer J Clin, 63*(1), 11-30.
- Smith, E. E., & Jonides, J. (1999). Storage and executive processes in the frontal lobes. *Science, 283*, 1657-1661.
- Song, L., Northouse, L. L., Braun, T. M., Zhang, L., Cimprich, B., Ronis, D. L., Mood, D. W. (2011). Assessing longitudinal quality of life in prostate cancer patients and their spouses: A multilevel modeling approach. *Quality of Life Research, 20*(3), 371-381.
- Vitaliano, P. P., Echeverria, D., Yi, J., Phillips, P. E., Young, H., & Siegler, I. C. (2005). Psychophysiological mediators of caregiver stress and differential cognitive decline. *Psychology and Aging, 20*(3), 402-411.
- Vitaliano, P. P., Zhang, J., Young, H. M., Caswell, L. W., Scanlan, J. M., & Echeverria, D. (2009). Depressed mood mediates decline in cognitive processing speed in caregivers. *The Gerontologist, 49*(1), 12-22.
- Wright, L. M. & Leahey, M. (1994). *Nurses and families: A guide to family assessment and intervention* (2nd ed.). Philadelphia, PA: F. A. Davis

CHAPTER V

Summary of the Three Papers

Over one and a half million people in the United States were diagnosed with cancer in 2013 (American Cancer Society, 2013). Family members are affected by the diagnosis as much as or even more than the patients (Northouse, Williams, Given, & McCorkle, 2012). Managing this life-threatening disease involves use of directed attention to the multiple demands imposed by the illness and its treatment. Directed attention is required to focus on the demands and adjustments inherent with the cancer trajectory. Mental effort in response to the myriad of demands for attention on the caregiver can lead to mental fatigue characterized by a decline in the capacity to direct attention (Kaplan & Kaplan, 1982). While cognitive impairment of caregivers has been documented (Caswell et al., 2003; Lee, Kawachi, & Grodstein, 2004; Mackenzie, Smith, Hasher, Lewach, & Behl, 2007; Vitaliano et al., 2005; & Vitaliano et al., 2009), there have been no studies on the mental fatigue of family caregivers of cancer patients, specifically cancer patients who participate in clinical trials.

The review of literature indicates that the capacity to direct attention relies on a global neural inhibitory mechanism that blocks competing stimuli during purposeful activity (Kaplan & Kaplan, 1982; Posner & Snyder, 1975). Therefore when the caregiver

directs attention to the important task at hand, distractions must be inhibited. As distractions surmount, more neural inhibitory effort is needed to block the distraction from interfering with caregiving activity such as learning a new treatment plan. Directed attention requires repeated application of the neural inhibitory process which can lead to mental fatigue thereby resulting in a decline in the caregivers' efficacy (Kaplan & Kaplan, 1982). Manifestations of mental fatigue are characterized by the fatigue of the neural inhibitory process; reduced effectiveness, hasty decision making, and making mistakes are a few examples (Cimpirch, 1995).

This dissertation project broadly sought to investigate the presence of mental fatigue in family caregivers of advanced stage cancer patients. This was accomplished by: 1) reviewing the literature on family caregivers of cancer patients; 2) using Family systems Theory and Stress and Coping theoretical frameworks to guide the research and variables selected for the dissertation; 3) exploring the experience of mental fatigue in family caregivers of advanced stage cancer patients; and 4) quantitatively examine the factors associated with mental fatigue.

The first manuscript, *Mental Fatigue and Quality of Life of Family Caregivers of Cancer Patients Participating in Phase I Clinical Trials*; The main finding of this paper was that a gap exists in the literature on mental fatigue of family caregivers of cancer patients. Little is known about the impact of mental fatigue on caregivers and their ability to provide proficient care, but some insight was provided. Caregiving is recognized as a stressful role that can affect multiple factors of the caregivers' quality of life. A domain of quality of life-cognition, has received consideration in family caregiver literature yet

fewer studies in the oncology setting. Therefore it is plausible that family caregivers of oncology patients may indeed experience cognitive deficits while performing this important role. Thus the focus of the dissertation research was placed on exploring mental fatigue in caregivers of cancer patients. The Stress Coping Model and Family Systems Theory were suitable frameworks for the application of the literature to guide the research questions.

The second manuscript, *Qualitative Analysis of the Experience of Mental Fatigue in Family Caregivers of Cancer Patients on Phase I Trials*, utilized qualitative methods in order to better understand the impact caregiving has on directed attention in family caregivers of cancer patients. This study was primarily guided by the Family Systems Theory which provided rationale for the inclusion of family members in the study of the cancer trajectory. Results from this study revealed caregivers to have multiple demands such as working outside the home, and having comorbidities to contend with. These caregivers were able to define mental fatigue but the majority reported that it did not affect the quality of care they provided. In addition the caregivers neglected their own health needs while providing proficient care to the family member. The findings from this study highlight the informational resources needed for family caregivers to recognize and manage mental fatigue.

The third manuscript, *Factors Associated with Mental Fatigue in Family Caregivers of Oncology Patients on Phase I Trials*, utilized path analysis to assess the relationship of antecedent variables, appraisal and coping on mental fatigue. The Theory of Stress and Coping along with the Family Systems Theory guided the study and

provided an appropriate foundation. A major finding of this study was that caregivers of cancer patients reported moderate levels of mental fatigue. Another significant result was that social support was a very important variable associated with mental fatigue because it had both a direct and indirect effect on mental fatigue. Age and caregiver burden had an indirect effect on mental fatigue, with negative impact on caregiver schedule being the main subscale indirectly related to mental fatigue. Greater use of avoidant coping was also associated with higher mental fatigue.

Family caregivers of advanced staged cancer patients experience mental fatigue which may interfere with learning, personal relations, and decision making. Caregivers have attentional demands to learn, organize, re-prioritize and carry out specific tasks (Kurtz, Kurtz, Given, & Given, 2004). An important consequence from these surmounting demands is mental fatigue. Therefore there is a need to design educational interventions to assist in the comprehension of material without compromising directed attention. Interventions to restore directed attention would be very valuable to this population (Kaplan & Kaplan, 1989).

Limitations of this dissertation include the cross-sectional study design which does not allow for changes in mental fatigue over time. The small sample size may also bias the results. The sample was primarily Caucasian; therefore the results are not generalizable to other racial and ethnic groups. Furthermore, all the individuals in this study are from the geographical region of the Midwestern United States, further limiting generalizability.

This study provided support for the need to assess caregivers of cancer patients for mental fatigue and also for addressing factors such as social support, burden, and coping that directly or indirectly affect their mental fatigue. The experience of mental fatigue may not be immediately apparent to the caregivers although the sequela may impact their health as primacy is placed on their role.

Future research needs to identify other factors that can help account for higher levels of mental fatigue in caregivers of cancer patients. Although this study focused primarily on caregiver variables, future studies could examine relational and patient factors associated with mental fatigue in caregivers. Future research needs to examine the relationship between mental fatigue and other important outcomes such as caregiver quality of life and depression, as well as patient quality of care outcomes.

References

- American Cancer Society. (2013). *Cancer Facts and Figures 2013*. Retrieved from http://www.cancer.org/acs/groups/content/@epidemiology_surveillance/documents/document/acspc-036845.pdf
- Caswell, L. W., Vitaliano, P. P., Croyle, K. L., Scanlan, J. M., Zhang, J., & Daruwala, A. (2003). Negative associations of chronic stress and cognitive performance in older adult spouse caregivers. *Experimental Aging Research*, 29, 303-318.
- Cimprich, B. (1995). Symptom management: Loss of concentration. *Seminars in Oncology Nursing*, 11(4), 279-288.
- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. New York, NY: Cambridge University Press.
- Kaplan, S., & Kaplan, R. (1982). *Cognition and environment: Functioning in an uncertain world*. New York, NY: Praeger.
- Kurtz, M. E., Kurtz, J. C., Given, C. W., & Given, B. A. (2004). Depression and physical health among family caregivers of geriatric patients with cancer-a longitudinal view. *Med Sci Monit*, 10(8), CR447-456.
- Lee, S., Kawachi, I., & Grodstein, F. (2004). Does caregiving stress affect cognitive function in older women? *The Journal of Nervous and Mental Disease*, 192(1), 51-57.

- Mackenzie, C. S., Smith, M. C., Hasher, L., Leach, L., & Behl, P. (2007). Cognitive functioning under stress: Evidence from informal caregivers of palliative patients. *Journal of Palliative Medicine, 10*(3), 749-758.
- Northouse, L., Williams, A., Given, B., & McCorkle, R. (2012). Psychosocial care for family caregivers of patients with cancer. *Journal of Clinical Oncology, 30*(11), 1227.
- Posner, M. I., & Snyder, C. R. (1975). Attention and cognitive control. In R. L. Solso (Ed.), *Information processing and cognition* (pp. 55-85). Hillsdale, NJ: Erlbaum.
- Vitaliano, P. P., Zhang, J., Young, H. M., Caswell, L. W., Scanlan, J. M., & Echeverria, D. (2009). Depressed mood mediates decline in cognitive processing speed in caregivers. *The Gerontologist, 49*(1), 12-22.
- Vitaliano, P. P., Echeverria, D., Yi, J., Phillips, P. E., Young, H., & Siegler, I. C. (2005). Psychophysiological mediators of caregiver stress and differential cognitive decline. *Psychology and Aging, 20*(3), 402-411.