THE STRESS-BUFFERING EFFECT OF SOCIAL SUPPORT IN GYNECOLOGIC CANCER SURVIVORS

DISSERTATION

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By
Kristen M. Carpenter, M.A.

The Ohio State University
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Dissertation Committee:
Barbara Andersen, Ph.D.
Steven Beck, Ph.D.
Michael Vasey, Ph.D.

Approved by

______________________________
Advisor
Graduate Program in Psychology
ABSTRACT

Research on cancer survivorship aims to identify adverse outcomes associated with diagnosis and treatment, including long-term side effects and late sequelae of treatment. Considering all prior quality of life studies in cancer survivorship, gynecologic cancer has largely been ignored. While a number of studies have examined the significant psychological and sexual morbidity that commonly occurs immediately following diagnosis and treatment (Andersen & Carpenter, 2003), much remains to be accomplished to detail and understand the psychosocial outcomes in long-term survivorship. Data from heterogeneous survivor samples suggest that social support is related to favorable physical and psychological outcomes. The present study tests social support as a moderator between health status and psychological outcomes, specifically, it tests the stress-buffering hypothesis, which states that those under the most stress benefit from social support (Cohen & Wills, 1985). In addition, this study documents various dimensions of cancer-related quality of life in a sample of gynecologic cancer survivors. It was hypothesized that poor cancer-related health status would be associated with increased levels of psychological distress and traumatic stress symptoms and that social support would moderate this relationship. A cross-sectional design was used and a series of hierarchical multiple linear regression models tested the buffering hypothesis. Patients in this sample demonstrated compromised health status, with scores generally in the range of cancer patients in active treatment or immediate follow-up and evidence of a variety of longstanding symptoms. These patients did not have exceptionally high levels of psychological distress or traumatic stress, though
a significant proportion (8% to 15%) reported symptoms in the clinically significant range. The hypothesis that poorer cancer-related health status would be associated with poorer psychological outcomes was unequivocally supported. While they did not provide evidence for moderation, the results for the psychological distress outcome indicated that those with better social support reported less psychological distress. Regarding the traumatic stress outcome, there was no evidence for a direct relationship with social support; however, results did provide evidence for stress buffering. Specifically, perceived support from friends and perceived availability of social resources appeared to protect patients from traumatic stress symptoms associated poor physical health status.
Dedicated to my father

who would have loved to see this
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VITA

November 11, 1974 ........................................... Born, Dearborn, Michigan.

1996 ............................................................ B.A., Psychology, Northwestern University.

2003 ............................................................ M.A., Psychology, Ohio State University

1996 – 2000 ................................................... Consulting Associate

2000 – 2005 ................................................... Graduate Teaching and Research Associate
Department of Psychology
The Ohio State University, Columbus, Ohio

2005 – 2006 ................................................... Psychology Resident
Department of Behavioral Sciences
Rush University Medical Center, Chicago, Illinois

PUBLICATIONS

Research Publications


**FIELDS OF STUDY**

Major Field: Psychology
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CHAPTER 1

INTRODUCTION

In its broadest definition, any person who has been diagnosed with cancer and is alive can be considered a “cancer survivor.” The notion of cancer survivorship was first described by Mullan (1985) as a process involving three stages. According to Mullan’s conceptualization, the first, acute phase of survivorship spans the period between diagnosis and the completion of initial treatment. The extended phase begins with completion of initial treatment and continues through a period of extensive follow-up, intermittent therapy, and watchful waiting. The final, permanent phase of survivorship, often referred to as remission, encompasses an extended period of disease-free living. This final phase of survivorship has received considerable attention in the cancer literature more recently.

Research on cancer survivorship aims to identify and examine the adverse outcomes associated with cancer diagnosis and treatment, including long-term treatment side effects and late sequelae of cancer treatment, e.g., cognitive deficits, fatigue, and lymphadema (Aziz, 2002). Considering all prior quality of life studies in cancer survivorship, most studies have focused on women with breast cancer (Gotay & Muraoka, 1998). However, gynecologic cancer cases comprise 11% of all new cancer diagnoses in women in the United States (Jemal et al., 2006) and 18% worldwide (Ferlay, Bray, Pisani, & Parkin, 2004). A number of studies have examined the significant psychological and sexual morbidity that commonly occurs following diagnosis and
treatment (see Andersen & Carpenter, 2003 for a review), but much remains to be accomplished to
detail and understand the psychosocial outcomes for gynecologic oncology patient as she
transitions to survivorship and understand the long-term impact of cancer diagnosis and treatment.
Indeed, survivorship research is included among the major initiatives of the National Cancer
Institute (NCI), a division of the National Institutes of Health (NIH). In a FY2003 request for
applications (NCI RFA CA-04-003), the NCI described a “critical need” for more physiologic,
psychological, social, and behavioral information about long-term cancer survivorship and specified
that attention should be directed at under-researched survivor groups, including gynecologic
cancer survivors. Specifically relevant to psychosocial oncology, the NCI has called for
researchers to examine the role of behavioral and sociocultural factors in moderating survivorship
outcomes.

The present study attempts to answer that call by 1) documenting various dimensions of
cancer-related quality of life in a sample of gynecologic cancer survivors; 2) examining the
association between a significant cancer-specific stressor (cancer-related health status, i.e.,
physical sequelae of cancer treatment) and the stress response (psychological distress and
traumatic stress symptoms); and 3) examining the association between those quality of life
outcomes and an important psychosocial construct, social support. More specifically, social
support is hypothesized to moderate the relationship between health status and the psychological
distress and stress associated with it (see Figure 1). Specifically, the proposed research will test
the stress-buffering hypothesis, which states that those subjected to the most stress benefit most
from the stress-alleviating properties of social support.
To begin, an overview of the research detailing the health status difficulties, psychological distress, and traumatic stress associated with gynecologic cancer survivorship is provided. The theoretical and empirical rationale for conceptualization of cancer-related health status, psychological distress, and traumatic stress as outcomes is then reviewed. The overview concludes with a discussion of the theoretical and empirical rationale for the examination of social support as a moderator (buffer) between the stressor (health status) and outcomes (psychological distress and traumatic stress).

Cancer Survivorship

Gynecologic Cancer Survivorship

Gynecologic cancer cases account for 11% of all new cancers in women in the United States. Approximately 53% of these involve the endometrium or uterus, 26% the ovary, 13% the cervix, and 8% the vulva, vagina, or other genital organs (Jemal et al., 2006). Screening techniques, such as the Pap smear for cervical cancer, and advances in cancer therapies have led to improved survival rates. Since the 1970s, death rates for gynecologic cancers have significantly declined: currently a reduction of 21% for endometrial cancer, 55% for cervical, and 8% for ovarian (Reis et al., 2004). For the majority of women diagnosed each year, gynecologic cancer is a survivable disease (Ries et al., 2004). Thus, of the approximately 77 thousand new gynecologic cancer cases each year (Jemal et al., 2006), more women will be living and, necessarily, be forced to cope with any psychological or behavioral morbidity.

Survivors live with the adverse effects of their disease and treatment, which constitute a significant physical and emotional adjustment (Wilmot & Botchway, 1999; Wilmot & Spinelli, 2000). Many studies have detailed the significant sexual morbidity that commonly occurs following
diagnosis and treatment for gynecologic cancer, with a smaller number of studies describing psychological quality of life outcomes. These studies generally focus on the two-year period following treatment (see Andersen & Carpenter, 2003 for a review), thus research is needed to understand the psychosocial outcomes for gynecologic oncology patients as they transition to survivorship. The following reviews the few studies that have been conducted with long-term survivors of gynecologic cancers, i.e., those in the “extended” and “permanent” phases of survivorship (Mullan, 1985). Refer to Table 1 for a summary of these studies.

Li, Samsioe, and Iosif (1999) compared health-related quality of life in a sample of Swedish endometrial cancer survivors to norms from a matched sample of healthy post-menopausal women from the general population. Eighty-four patients with a confirmed diagnosis of stage I-III endometrial cancer who had survived five to seven years post-diagnosis were eligible and mailed an author-developed questionnaire. Of these, 23 (27%) did not respond and 3 (4%) submitted incomplete data, yielding a sample of 58 (69%) women (stage I, n=54; stage II, n=2; stage III, n=2). Participants were divided into two groups: older survivors (n=34, mean age=74) and younger survivors (n=27, mean age=56) to facilitate comparison with the relatively young (mean age=55) control group. Approximately half the women were treated with surgery only (n=50, 51%); the others received adjuvant radiotherapy and/or chemotherapy as well. Available data for the control group restricted comparisons to the younger group of cancer survivors. Over 63% of younger survivors reported significant depressive symptoms. In addition, younger patients reported greater depressive symptoms than older patients or controls and reported feeling more “overstressed” than older patients. Regarding somatic symptoms, younger patients reported significantly more stomach discomfort, nausea, and diarrhea than controls. Younger patients also
reported significantly lower energy than controls. There were no significant differences between younger and older patients on these variables. These data illustrated a high frequency of physical problems and psychological distress, with younger patients experiencing more distress than older patients, an effect that lasted up to seven years following diagnosis (Li, Samsioe, & Iosif, 1999).

Matthews and colleagues (1999) surveyed patients diagnosed with clear-cell adenocarcinoma of the vagina or cervix from the United States and Canada who were listed in the Registry for Research on Hormonal Transplacental Carcinogenesis. Of the 260 women contacted by mail, 220 completed the questionnaire (85%). Mean age at diagnosis was 23 years old; average time since diagnosis was 18 years. Twenty-four (11%) had experienced a recurrence (mean timing of recurrence was six years post-diagnosis). Eleven percent had metastatic disease at diagnosis, 89% were treated surgically, and 63% opted for vaginal reconstruction following surgery. Thirty-seven percent were also treated with radiotherapy or chemotherapy. Items on the author-developed measure assessed health status, coping, and perceived health and quality of life. The Beck Depression Inventory (BDI; Beck & Steer, 1984) was used to assess depressive symptoms; a variety of author-developed measures were used to assess other aspects of psychological functioning and quality of life, including social support, perceived health, and coping. Forty-six percent of patients reported feeling less healthy than other women their age, 22% reported that their disease interfered at least moderately with their ability to fulfill life roles, with 21% reporting that “it is impossible for me to reach my goals.” Regarding somatic symptoms, 12% reported current pelvic pain, 28% reported current urinary incontinence, 17% reported difficulty initiating urination, 13% reported recurrent bladder or urinary tract infections, 20% reported chronic diarrhea, and 15% chronic constipation. Results indicated that 17% of patients were mildly
depressed and 9% were moderately or severely depressed. A series of hierarchical multiple regressions were used to examine predictors of depressive symptoms. Results indicated that, although illness variables such as self-rated health status and medical complications did not predict depressive symptoms, low perceived social support was associated with poorer outcomes. In general, patients in this sample described their health in favorable terms, but a substantial portion of them continued to experience a variety of debilitating somatic symptoms and depressive symptoms several years following their diagnosis and treatment. A high frequency of physical problems was evident, but did not predict psychological distress, possibly due in part to the use of unstandardized, author-derived measures of psychological functioning and quality of life (Matthews, Aikens, Helmrich, Anderson, Herbst, & Waggoner, 1999).

Carlsson, Strang, and Bjurnstrom (2000) used a cross-sectional design to assess the effects of treatment modality on quality of life in a heterogeneous sample of Swedish gynecologic cancer survivors. Patients were approached during follow-up visits to the outpatient gynecology clinic. Of the 261 patients recruited, 235 (90%) agreed to participate. Disease sites included the cervix (n=65, 28%), endometrium (n=80, 35%), ovary (n=55, 24%), and other reproductive sites (n=29, 12%). Fifty-two percent (n=188) were treated surgically, 44% with radiotherapy, and 22% with chemotherapy. Patients were divided in to four groups: <one year since treatment (n=90, 41%), one to three years post-treatment (n=66, 30%), three to five years post-treatment (n=38, 17%), and >five years post-treatment (n=27, 12%). Results indicated that quality of life (EORTC Quality of Life Questionnaire-Cancer,QLQ-C30; Aaronson et al., 1993) and magnitude of physical symptoms improved over time. Results indicated that women under 40 had better physical functioning than those ages 40 to 65 and those older than 65. Physical symptoms were
significantly worse in patients treated in the past year than in all other groups. There were also significant differences between those treated one to three years earlier and >five years earlier ($p<0.05$). Role functioning, emotional functioning, cognitive functioning, and overall quality of life were all significantly lower for those treated in the last 12 months, compared to those treated three to five years prior to assessment. Interestingly, those treated >five years prior to assessment were not significantly different on these variables than those treated within the past 12 months, possibly due to late sequelae of treatment, such as lymphadema and chemotherapy-induced neurotoxicity.

Regarding differences by treatment modality, those treated with chemotherapy had poorer role and cognitive functioning and more problems with fatigue, nausea and vomiting, dyspnea, and constipation than those not treated with chemotherapy ($p<0.05$). Those treated with radiotherapy had significantly more problems with flatulence and diarrhea than those who were not ($p<0.05$). In addition, those treated with either chemotherapy or radiation had more long-term physical side effects, such as fatigue, nausea, vomiting, dyspnea, constipation, and flatulence, than those treated with surgery-only in each group, with those treated more than five years prior to assessment reporting significantly more problems than those treated one to three years or three to five years prior. In summary, patients reported substantial long-term treatment-related side effects, with patients receiving adjuvant chemotherapy or radiotherapy reporting significant physical and role functioning disruptions, which might worsen over time (Carlsson, Strang, & Bjurstrom, 2000).

Stewart and colleagues (2001) reported data from a mailed survey of ovarian cancer survivors. Patients diagnosed with and treated for ovarian cancer in the United States and Canada through a university-affiliated cancer center and an international newsletter for ovarian cancer survivors. Those who were disease-free and not in treatment for two years or more were eligible
(N=295). Two hundred completed the questionnaire (68% response rate). Mean age at the time of the survey was 55 years old; average time since diagnosis was 7 years, with 31% diagnosed between 2 and 5 years ago, 48% between 5 and 10 years ago, and 21% more than 10 years ago. Quality of life and physical functioning were measured using the EORTC QLQ-C30 (Aaronson et al., 1993) and items derived from a variety of other quality of life measures. Ninety-eight percent underwent hysterectomy and oopherectomy, 84% received chemotherapy, and 22% received radiotherapy. Of those who underwent chemotherapy, 45% reported difficulty thinking and 52% reported memory difficulties. This finding was not related to age or menopausal status. More than half (53%) of patients reported current pelvic pain or discomfort that they attributed to their cancer treatment. Moreover, 53% of patients reporting pain described it as moderate to severe. In spite of these physical symptoms, mental health and energy level were comparable to available norms and most patients reported that the experience of ovarian cancer had impacted their life in a positive way, suggesting that physical functioning difficulties are more apparent in survivorship than psychological adjustment difficulties (Stewart, Wong, Duff, Melancon, & Cheung, 2001).

In a telephone survey of long-term survivors of stage I-II ovarian cancer, Wenzel and colleagues (2002) described quality of life and the physical and psychological sequelae associated with diagnosis and treatment. Women accrued to a clinical trial of quality of life in gynecologic cancer who had remained disease-free for five to ten years were eligible (N=112). Of these, 8 declined participation, 1 was deceased, 1 was lost to follow-up, 13 did not return the consent form, and 40 otherwise could not be reached (e.g., did not return calls), yielding a sample of 49 women. Patients were initially contacted by mail; those who consented to participate were telephoned and completed the one-time assessment. Mean age at diagnosis was 56 years old; mean time since
diagnosis was nine years. Thirty-eight patients (78%) were diagnosed with stage I disease, the remaining 11 (22%) with stage II disease. Ninety-four percent were treated surgically, 39% with radiotherapy, and 59% with chemotherapy. Twenty percent reported substantial treatment side effects, including abdominal pain (up to 18% on an author-developed measure) and neurotoxicity (up to 39% on the FACT-G neurotoxicity subscale, Calhoun et al., 2000). Results indicated that scores on measures of physical, emotional, and social well-being were comparable to available norms for other cancer survivors and non-cancer controls, though 20% and 23% of patients were below norms for emotional and social functioning, respectively (MOS SF-36; Ware & Sherbourne, 1992). In this sample, emotional well-being was significantly associated with self-reports of general health and vitality (MOS SF-36; Ware & Sherbourne, 1992) and with depressive symptoms (CES-D; Radloff, 1977). Survivors also reported significant distress related to fear of recurrence (22%), fear of a second cancer (36%), and future diagnostic screening (30%), though they reported that the most significant challenge of survivorship was long-term sequelae of treatment, which 20% of patients rated as their primary concern. These results indicate that, while most early-stage ovarian cancer survivors function as well or better than their counterparts who have not experienced cancer, 20% to 23% do experience long-term treatment sequelae that are associated with poor social functioning and emotional functioning, including depressive symptoms and fears about additional experiences with cancer (Wenzel et al., 2002).

Miller, Pittman, Case, and McQuellon (2002) compared quality of life in a heterogeneous sample of gynecologic cancer patients to an unmatched sample of healthy women seeking routine gynecologic care. Gynecologic cancer patients who were at least six months post-treatment and in active follow-up at a university-affiliated clinic were eligible. Of the 100 approached, 6 patients
declined participation and 9 provided incomplete data, yielding a sample of 85 women (85% response rate). Disease sites included the cervix (n=51, 60%), endometrium (n=24, 28%), and ovary (n=10, 12%). Of the 50 healthy women approached to complete the survey, 8 declined (84% response rate). Mean age in the cancer group was 59 years, compared to 56 years for the healthy group (ns). In the cancer group, 71% had been treated surgically, 49% with radiotherapy, and 26% with chemotherapy. Average time since diagnosis for cancer patients was three years. Results indicated that quality of life scores (FACT-G; Cella, Tulsky, & Gray, 1994) were comparable in the cancer and healthy comparison groups (all p>0.05). Functional subscale scores were lower in patients with ovarian cancer, women with fewer years of education, and women with no help at home. Emotional well-being scores were also significantly lower for ovarian patients than for cervical or endometrial cancer patients. Overall quality of life scores were higher for those with non-ovarian diagnosis (p=0.02) and those who did not receive adjuvant treatment (p<0.001). Thus, although quality of life scores were comparable for cancer patients and healthy controls, these results suggest that ovarian cancer survivors and those who underwent adjuvant therapy are particularly at-risk for quality of life disruptions (Miller et al., 2002).

Most recently, Frumovitz et al. (2005) conducted a phone survey of long-term survivors of stage I cervical cancer (n=74). Patients treated at least five years prior to data collection were eligible. Patients >55 years old at the time of treatment were excluded for reasons that the authors did not specify. In addition, patients treated with any combination of radiotherapy and another treatment (i.e., surgery or chemotherapy) were excluded. An age- and race-matched control group was also recruited from the cancer prevention clinic at the same institution (n=40). Of the 145 patients eligible for participation, 61 (42%) could not be contacted and 6 (4%) declined
participation. An additional 4 patients were excluded from data analyses due to the exclusion criteria described above, yielding an overall participation rate of 51%. Cancer patient were divided into two groups: those treated with radiation therapy and those treated with radical hysterectomy. Mean age for the hysterectomy group was 44 years, radiation group 47 years, and for the control group 43 years. These were statistically equivalent. Mean time since diagnosis was eight years for the hysterectomy group and seven years for the radiation group (ns). Results indicated that, compared to both groups, patients receiving radiation had relatively poorer physical QoL (SF-12; Ware, Kosinski, & Keller, 1996) and greater incidence of menopausal symptoms (Menopausal Survey; Ganz et al., 2000) and somatization symptoms (BSI-18; Zabora et al., 2001). In addition, these patients reported significantly higher levels of depressive and anxious symptoms (BSI-18; Zabora et al., 2001). Taken together, these results suggest that, in this limited sample of stage I cervical cancer survivors, patients receiving radiation therapy are at higher risk for physical and psychological quality of life disruptions (Frumovitz et al., 2005).

Summary

The results from studies of gynecologic cancer survivorship suggest three trends. First, side effects of treatment are common and persistent (Carlsson et al., 2000; Li et al., 1999; Matthews et al., 1999; Stewart et al., 2001). In fact, a subset of patients rate the physical sequelae of cancer treatment as the most significant challenge of survivorship (Wenzel et al., 2002). Second, comparisons between normative samples and gynecologic cancer survivors indicate few significant differences in mood and quality of life. Still, a portion of patients, ranging from 20% to 63% across studies, have quality of life and psychological adjustment difficulties long after diagnosis and treatment (Li, Samsioe, & Iosif, 1999; Matthews et al., 1999; Wenzel et al., 2002).
There are no data available on the experience of traumatic stress symptoms in gynecologic cancer; such data are needed to better understand the experience of the gynecologic cancer patients. Third, there appears to be a relationship between the magnitude of physical symptoms and impairment and psychological quality of life deficits, particularly for those who received adjuvant therapy (Carlsson et al., 2000; Miller et al., 2002; Wenzel et al., 2002). Ovarian cancer patients might be at risk for impairments, due in part to their aggressive treatment regimens (Miller et al., 2002). There are no basic data on the relationship between social support and psychosocial outcomes in this population, which limits the ability of researchers and clinicians to explore the benefits of social support as an intervention target. Thus, the primary difficulties in survivorship include health status (physical functioning/impairment) and psychological outcomes, however it is health status that might pose the greatest challenge to these patients. Data from the broader cancer survivorship literature provides further support and sheds additional light on these challenges and will be discussed below.

Evidence of Health Status Difficulties among Cancer Survivors

Consistent with findings for gynecologic cancer survivors, the broader survivorship literature indicates that health status is significantly impaired among cancer survivors. Measures of health status assess the degree to which an individual experiences physical sequelae of cancer and treatment. Operationalizations of health status include indices of global physical functioning (e.g., physical functioning, functional status), assessments of the functioning of specific bodily systems (e.g., functioning of gastrointestinal or reproductive organs), and measures of specific symptoms, such as fatigue, bodily pain, or vaginal changes. To illustrate the subjective experience of the cancer survivor, Greaves-Otte and colleagues (1991) reported that 20% of a sample of 649
heterogeneous cancer patients considered themselves “disabled.” Research documenting the magnitude of physical symptoms following breast cancer diagnosis and treatment shed light on this statistic. For instance, Bush and colleagues (1995) conducted a single assessment of 125 survivors of BMT (mean time since treatment = 10 years). Sixty percent of survivors had been diagnosed with leukemia, 34% with anemia, and 6% with other cancers. The authors reported high rates of a variety of physical symptoms associated with their cancer diagnosis and treatment (EORTC QLQ-C30; Aaronson et al., 1993), including fatigue (56% of patients), eye problems (49%), sleep disturbances (43%), pain (41%), constipation/diarrhea (27%), mouth and throat complaints (27%), pulmonary difficulties (22%), appetite loss (18%), and nausea and vomiting (13%). Kornblith et al. (2003) also reported substantial long-term physical sequelae of cancer diagnosis and treatment in a sample of breast cancer survivors (N=153, time since diagnosis = 20 years). Patients in this sample experienced significant lymphadema (39%) and anesthesia in the hands and/or chest on the operated side (33%), in spite of the long interval since treatment.

Two controlled studies provide additional evidence for the high incidence of health status concerns. Hewitt, Rowland, and Yancik (2003) analyzed population-based data from the National Health Interview Survey (NHIS), which includes data for over 95,000 adults. Data from the 4,878 individuals diagnosed with cancer were compared to the 90,737 with no cancer history. Disease sites included the reproductive organs (33%), breast (21%), colon (10%), skin (7%), and other (29%); modal time since diagnosis was 5-9 years.¹ Results indicated that cancer survivors were significantly more likely than controls to rate their health as “fair” or “poor” (30% vs. 11%). In fact, cancer survivors were more than twice as likely to report poor or fair health than individuals

¹ Data were coded categorically.
diagnosed with other chronic illnesses. They also reported greater limitations in activities of daily living (11% vs. 3%) and the presence of multiple functional limitations (58% vs. 29%), compared to the controls. These results suggest that the gynecologic cancer literature (Carlsson et al., 2000; Li et al., 1999; Matthews et al., 1999; Stewart et al., 2001; Wenzel et al., 2002) is consistent with the broader survivorship, which demonstrates a variety of health status difficulties.

**Evidence of Psychological Distress among Cancer Survivors**

In addition to physical complaints, high rates of psychological distress are apparent among cancer survivors. Indeed, one thorough review of quality of life in cancer survivorship concluded that survivors continue to experience negative psychological effects in their daily lives well beyond the completion of therapy (Gotay & Muraoka, 1998). Consistent with this, the Hewitt et al. (2003) analyses of the population-based NHIS data (N=95,615) revealed that cancer patients had more self-reported debilitating psychological problems than controls who were not diagnosed with cancer. Of note is the finding that women with cervical cancer were significantly more likely to report psychological distress than all other patients. These findings are mirrored in studies employing extensive assessments in smaller samples.

In one retrospective study of breast cancer survivors (N=22, time since diagnosis = 8 years or more), Halttunen, Hietanen, Jallinoja, and Lonqvist (1992) discovered that 73% of survivors stated that they felt depressed more often after being diagnosed with cancer than they did before their cancer. In studies assessing current psychological distress, this result is confirmed. Parker and colleagues (2003) interviewed a heterogeneous sample (N=351; 30% breast, 31% gastrointestinal, 17% gynecologic, and 22% urologic) of cancer patients with a mean time since diagnosis of three years. They examined multiple aspects of psychological adjustment including
depressive symptoms (CES-D, Radloff, 1977), anxiety symptoms (STAI, Spielberger et al., 1970), and psychological quality of life (MOS SF-12, Ware, Kosinski, & Keller, 1996). Results indicated elevated levels of both depressive and anxiety symptoms for survivors, with over one-third of survivors scoring in the clinically significant range on the CES-D and anxiety scores corresponding to the 76th percentile for women and 63rd percentile for men. These data also suggest that gynecologic cancer patient might be at higher risk for maladjustment than individuals with other disease sites, with higher anxiety scores than breast cancer, gastrointestinal cancer, and urologic cancer survivors, higher depression scores and lower mental health scores than gastrointestinal and urologic survivors.

Results from Brown et al. (2003) are consistent. In a sample of 205 heterogeneous cancer patients (48% breast, 52% lung, colon, head and neck, prostate, uterus, ovary, colon, and rectum) with a mean time since diagnosis of 9 years. Results indicated that mean CES-D score for survivors was 20. As the clinically significant cut-off score for the CES-D is 16, the incidence of depressive symptoms was high. The authors did not relate CES-D scores with other variables, such as age, SES, or prognosis.

One controlled study provides additional support for a high incidence of psychological distress symptoms in cancer survivorship. Saleeba and colleagues (1996) compared depressive (BDI; Beck & Steer, 1984) and anxiety (STAI; Spielberger et al., 1970) symptoms in a sample of 52 breast cancer survivors (mean time since diagnosis = 9 years) to a control group of 88 women who had recently undergone low-risk breast cancer screening. Results indicated significantly higher levels of depressive symptoms in the cancer group. In addition, a greater number of cancer
survivors fell into the “mild” to “moderate” symptom range for both depression (29% vs. 9%) and anxiety (23% vs. 11%) symptoms.

In summary, cancer survivorship is associated with elevated symptoms of psychological distress and a higher proportion of individuals falling within the clinical range for symptoms.

Cancer survivors report higher rates of debilitating psychological problems (Hewitt et al., 2003), depressive symptoms (Brown et al., 2003; Halttunen et al., 1992; Parker et al., 2003; Saleeba et al., 1996), and anxiety symptoms (Parker et al., 2003; Saleeba et al., 1996). Furthermore, gynecologic cancer patients might be at particularly high risk for such difficulties, compared to other cancer survivors (Hewitt et al., 2003; Parker et al., 2003).

Evidence of Traumatic Stress among Cancer Survivors

To complement the literature on psychological distress in cancer survivorship, a growing literature has described the presence of traumatic stress symptoms in cancer survivors. These studies have generally focused on breast cancer patients and patients who have undergone bone marrow transplantation (BMT), a particularly aggressive treatment approach (for a review, see Gurevich, Devins, & Rodin, 2002). The data include reports of elevated symptom levels and numbers of diagnostic cases of PTSD. Bleiker and colleagues (2000) used a prospective, longitudinal design to assess traumatic stress symptoms in a sample of 244 breast cancer survivors. Women completed the Impact of Events Scale (IES; Horowitz, Wilner, & Alvarez, 1979) prior to radiation therapy and again two years later. The percentage of women with clinically significant traumatic stress symptoms was considerable, with 47% scoring in the moderate to high range for symptoms of intrusion and 33% scoring in the moderate to high range for avoidance. Cordova et al. (1995) assessed post-traumatic stress symptoms in a sample of 55 breast cancer
survivors (mean time since diagnosis = 3 years) using the PTSD Checklist Civilian version (PCL-C; Weathers, Huska, & Keane, 1991) and Impact of Events Scale (IES; Horowitz et al., 1979) and reported similarly high rates of symptoms, with as many as 44% of patients endorsing particular symptoms. These results were replicated in an identical study involving another sample of 82 breast cancer survivors (mean time since treatment = 3 years; Andrykowski & Cordova, 1998).

Smith, Redd, DuHamel, Vickberg, and Ricketts (1999) discussed specific symptoms (PCL-C; Weathers et al., 1991) in detail in a sample of 111 BMT recipients (mean time since BMT = 4 years). Thirty-three percent of participants reported thoughts about a foreshortened future, 30% reported having trouble remembering parts of their treatment, and 30% reported having trouble falling or staying asleep. Kornblith and colleagues (2003) reported that patients experience multiple traumatic stress symptoms frequently in a sample of 153 long-term breast cancer survivors (mean time since diagnosis = 20 years). In this sample, over 15% of participants reported that they experienced at least two traumatic stress symptoms (PCL-C; Weathers et al., 1991) “moderately” or “extremely” often.

Studies using diagnostic interviews, e.g., SCID, are consistent with reports of studies using symptom frequency/severity measures. For instance, Widows, Jacobsen, and Fields (2000) reported a rate of 5% incidence of PTSD in a sample of 102 heterogeneous cancer survivors (49% breast cancer, 15% lymphoma, 10% leukemia) who were completed the Structured Clinical Interview for the DSM-IIIR – Nonpatient version – PTSD Module (SCID-NPV-PTSD; APA, 1990) an average of two years post-treatment. Cordova et al. (1995) and Andrykowski and Cordova (1998) obtained similar results in two samples of breast cancer survivors (see above). Results indicated that 5% to 6% of survivors met diagnostic criteria for PTSD and an additional 7% demonstrated
elevated, but subsyndromal symptoms based on the SCID-NPV-PTSD. Nonetheless, while diagnostic cases of PTSD are not common, elevated symptoms of traumatic stress have been observed in a variety of cancer survivor samples. The experience of traumatic stress symptoms has not yet been studied in gynecologic cancer survivors, in spite of gynecologic cancer diagnosis and treatment constituting a significant stressor for patients.

Evidence for Relationships between Health Status and Psychological Distress

Despite its curative intent, cancer treatment, particularly adjuvant therapies such as chemotherapy or radiation, constitutes a substantial insult to the patient’s body. As noted above, treatment morbidities such as fatigue can be substantial and long lasting. Late sequelae of treatment, such as lymphadema and neuropathy, often do not become apparent for months or years following completion of therapy for breast cancer (Aziz, 2002). Thus, it is not surprising that health status has been linked to the experience of psychological distress and traumatic stress in cancer survivors. As discussed previously, Michael and colleagues (2002) have reported that women diagnosed with breast cancer (N=708) report poor health-related quality of life (MOS SF-36, Ware & Sherbourne, 1992; CARES-SF, Schag, Ganz, & Heinrich, 1991). Furthermore, those with lingering side effects of treatment demonstrated poorer mental health and global quality of life than their counterparts with fewer health status difficulties, which is consistent with a link between health status and psychological outcomes. Results from Vickberg et al. (2000) indicated similar associations in a sample of 61 breast cancer survivors (mean time since diagnosis = 7 years). Poor physical functioning (MOS SF-36 physical health component score; Ware & Sherbourne, 1992) was associated (r=.46, p<.01) with self-reported psychological distress (BSI; Derogatis & Spence, 1982), a general indicator of psychological health that includes somatization, obsessive,
depressive, anxious, hostile, phobic, and other symptoms of psychopathology. Finally, Kornblith and colleagues (2003) found that the experience of psychological distress (BSI; Derogatis & Spence, 1982) was associated with the experience of cancer symptoms and physical functioning (EORTC QLQ-C30; Aaronson et al., 1993), in a sample of 153 long-term (mean time since diagnosis = 20 years) breast cancer survivors.

Data from other cancer survivor samples also demonstrate a relationship between health status and psychological distress. For instance, Bjordal and Kaasa (1995) found that 30% of a sample of 204 head and neck cancer survivors (time since diagnosis = 7-11 years) exhibited elevated levels of psychological distress (General Health Questionnaire, GHQ; Goldberg & Williams, 1988). Correlational analyses indicated that those who reported the poorest physical functioning (EORTC QLQ-C30; Aaronson et al., 1993) and those with a higher degree of pain or fatigue were more likely to experience psychological distress than survivors reporting better physical functioning. Vickberg et al. (2001) used hierarchical multiple regression to examine predictors of psychological distress (BSI; Derogatis & Spence, 1982) in a sample of 85 leukemia survivors who had undergone BMT an average of 4 years earlier. They discovered that physical functioning (MOS SF-36 PCS; Ware & Sherbourne, 1992) was a significant predictor of global psychological distress and depressive and anxiety symptoms (BSI; Derogatis & Spence, 1982). Although these results are consistent with a relationship between health status and psychological distress, this relationship has not yet been examined in gynecologic cancer survivors.

Evidence for Relationships between Health Status and Traumatic Stress

Results for traumatic stress are comparable to the distress outcomes. In the study discussed previously, Kornblith and colleagues (2003) found that the experience of traumatic
stress symptoms (PCL-C; Weathers et al., 1991) was significantly positively correlated with reports of lymphedema and numbness in the torso in a sample of 153 long-term (mean time since diagnosis = 20 years) breast cancer survivors. PCL-C scores were also significantly correlated with reports of general physical symptoms (EORTC QLQ-C30; Aaronson et al., 1993). Vickberg and colleagues (2001) focused on a sample of post-BMT leukemia survivors (N=85) and yielded similar results. Poorer physical functioning (MOS SF-36; Ware & Sherbourne, 1992) was associated with higher rates of three categories of PTSD symptoms, including re-experiencing, avoidance and numbing, and hyperarousal (PCL-C; Weathers et al., 1991). Bleiker et al. (2000) conducted a prospective study of 244 women with breast cancer (time since diagnosis = 2 years). Results indicated that health complaints and sleeping problems (Symptom Checklist-90, SCL-90; Derogatis, Rickels, & Rock, 1976) were uniquely associated with intrusion symptoms (IES; Horowitz et al., 1991), but not avoidance symptoms. Lewis and colleagues (2001) obtained similar results in a sample of 64 breast cancer survivors (mean time since treatment = 7 years); physical functioning (MOS SF-36; Ware & Sherbourne, 1992) was associated with intrusive thoughts (IES; Horowitz et al., 1991), but not avoidance symptoms. Thus, while health status might not be a reliable predictor of all types of traumatic stress symptoms, it appears to contribute to at least a subset of those symptoms in cancer survivors.

Regarding diagnostic cases of PTSD, Smith et al. (1999) examined traumatic stress in a heterogeneous sample of cancer survivors (N=111) who had undergone BMT an average of 4 years prior to assessment. They found that risk of meeting PTSD criteria, as measured by the PCL-C (Weathers et al., 1991) and IES (Horowitz, Wilner, & Alvarez, 1979), increased with lower physical role functioning (MOS SF-36; Ware & Sherbourne, 1992). Again, these results are
consistent with the notion that the health status difficulties associated with cancer survival are a source of stress and are linked to adverse psychological outcomes and perhaps clinical levels of distress, but this association has not been tested in gynecologic cancer survivors, who often undergo more debilitating and disfiguring treatments than patients with other disease sites.

**Social Support**

The term social support refers to a variety of phenomena that characterize an individual’s social environment. In the psychosocial literature, researchers have distinguished between the structural and functional aspects of social support (see Helgeson, 2003; Wethington & Kessler, 1986). Structural social support refers to the mere presence of social relationships, i.e., the size of a social network or the degree to which an individual is involved in relationships with a number of people or groups. Structural support, sometimes referred to as “social integration” or “received support,” has such varied operationalizations as presence or absence of a romantic partner, number of close friends, number of group memberships, or overall size of social network, but is often expressed as a composite of several of these indicators. Functional social support, or “perceived support,” refers to an individual’s perceptions of the resources their social network provides, i.e., the extent to which the social network is perceived as supportive. Items on measures of functional support often reflect the degree to which an individual feels loved or cared for, receives assistance when needed, or receives advice or guidance when sought (Helgeson, 2003). Several taxonomies of functional support have been used, though the four most common categories found in psychosocial research are esteem support (also referred to as emotional support) – the extent to which person feels accepted; informational support – assistance, defining and understanding difficult events; social companionship (i.e., belongingness) – spending time with
others; and instrumental support (i.e., tangible support) – the provision of material resources such as money or services (Cohen, 1988; Gottlieb, 1978; Reis, 1984; Wills, 1991).

Social Support and Health

Data suggest an association between social support and psychological well-being in the health psychology literature. For instance, individuals with greater social support are less likely to suffer from various psychological disorders (Cohen, McGowan, Fooskas, & Rose, 1984) or to exhibit neurotic (Procidano & Heller, 1983), depressive (Hays, Turner, & Coates, 1992), or anxious (Sherbourne & Hays, 1990) symptoms. Social support has also been shown to be associated with a variety of favorable physical health outcomes, including lower likelihood of illness, enhanced recovery when illness occurs, and reduced risk of morbidity and mortality (for a review, see House, Landis, & Umberson, 1988). The first study linking social support to health outcomes was conducted in Alameda County, California. Nearly 7,000 individuals were surveyed about their social networks, including questions about marital status, contacts with extended family and friends, and group affiliation. Death rates were tracked over nine years following initial contact; those with fewer social ties were more likely to die during the follow-up period. In fact, individuals with larger social networks survived over two years longer than their counterparts with smaller networks, controlling for SES, health status, and health habits (Berkman & Syme, 1979). These landmark results led a number of researchers to examine the relationship between social support and physical health outcomes in the context of acute disease and chronic illness.

As indicated by the Alameda County study, social support is associated with lower rates of morbidity and mortality in the context of illness. For instance, smaller social networks have been associated with higher rates of coronary artery disease in adult men. In a sample of 736 Swedish
men followed for six years, lack of social support was second only to smoking as a risk factor for developing coronary artery heart disease (Orth-Gomer, Rosengren, & Wilhelmsen, 1993). Social support also appears to benefit patients following myocardial infarction (MI). In a sample of 596 MI patients, increased survival rates were associated with high and medium levels of social support. Those with low levels of social support were at nearly twice the risk for mortality even when important prognostic variables such as gender, ethnicity, SES, health behaviors, and comorbid conditions were controlled (Farmer, Meyer, Ramsey, Goff, & Wear, 1996). In a prospective study of social support in MI patients (N=112), Pedersen and colleagues (2004) found that lower baseline social support associated with 10% increased risk of recurrent cardiac events at nine-month follow-up, once again controlling for relevant prognostic variables. Morbidity is also related to the functional aspects of social support. For instance, faster progression to AIDS in HIV-positive patients has been linked to satisfaction with current social support. In fact, risk of AIDS doubled for every 1.5-unit decrease in support satisfaction in a sample of 82 HIV-positive men assessed at the time of diagnosis and every six months thereafter for seven years (Leserman et al., 2000; follow-up study confirmed in 2002).

Social support is also related to the experience of symptoms of chronic illness. For instance, several studies have examined this relationship in arthritis patients. Greater numbers of social contact have been associated with less pain (DeVellis et al., 1986), fewer clinical indicators such as inflammation (Evers, Kraaimaat, Geenen, Jacobs, & Bijlsma, 2003), and decreased mobility (Evers, Kraaimaat, Geenen, & Bijlsma, 1998). In a one-year study of patients with asthma (N=92), Smith and Nicholson (2001) found that those with larger social networks reported fewer bouts of upper respiratory tract infections that resulted in exacerbation of pulmonary symptoms. It
is important to note that the observed effects occur independent of health behaviors that could be supported by members of the social network via increased positive affect, increased tangible support, or encouragement of important health behaviors, such as diet and exercise.

Social support is also correlated with psychological quality of life outcomes in the context of disease and chronic illness, independent of the biological pathways that are associated with susceptibility to disease. In cardiac patients, better perceived support has been associated with lower incidence of depressive symptoms (Carels, 2004; Holahan, Moos, Holahan, & Brennan, 1997; Pedersen, Middel, & Larsen, 2002), anxiety symptoms (Pedersen, Middel, & Larsen, 2002), and PTSD symptoms (Pedersen, Middel, & Larsen, 2002). Arthritis patients also appear to benefit psychologically from social support. More extensive social networks have been associated with less psychological distress (Evers, Kraaimaat, Geenen, & Bijlsma, 1997; Fitzpatrick, Newman, Archer, & Shipley, 1991), in particular depressive symptoms (Fitzpatrick, Newman, Archer, & Shipley, 1991; Penninx, Van Tilburg, Deeg, & Kriegsman, et al, 1997). Furthermore, Penninx et al. (1997) demonstrated that the relationship between social support and depressive symptoms in arthritis is strongest among the most severe cases. Finally, functional and structural support have been associated with quality of life in HIV/AIDS patients. Functional support predicts global stress (Grassi, Caloro, Zamorani, & Ramelli, 1997; Serovich, Kimberly, Mosack, & Lewis, 2001), irritability (Grassi et al., 1997), loneliness (Serovich et al., 2001), hopelessness (Grassi et al., 1997), and depressive symptoms (Grassi et al., 1997; Serovich et al., 2001). Structural support also appears to be important in living with HIV/AIDS. For instance, more extensive social networks tend to be associated with lower rates of depressive symptoms (Hays, Turner & Coates, 1992; Richardson et
al., 2001), even when controlling for previous depressive symptoms and other prognostic indicators (Hays et al., 1992).

Social Support and Cancer

Structural Support. There is little data on the relationship between social support and quality of life in gynecologic cancer, however a substantial literature describes the long-term benefits of social support in cancer survivorship. For instance, better social support has been associated with positive disease outcomes. Waxler-Morrison et al. (1991) conducted a quasi-prospective (initial contact following diagnosis, but prior to treatment), longitudinal study of breast cancer survivors (N=188) in which they followed patients for four years following diagnosis. At the four-year follow-up, results indicated that number of supportive friends, number of supportive persons, employment status, marital status, amount of contact with friends, and total size of social network each were independently related to survival, even when controlling for nodal involvement (i.e., degree of cancer spread) and disease stage. Those with more social contacts or supportive others reliably lived longer than their counterparts with less structural support. In a prospective design, Michael and colleagues (2002) examined health-related quality of life in a sample of breast cancer survivors drawn from a larger longitudinal study of women’s health (Nurses’ Health Study). Data collection began in 1976 and assessments occurred every two years. Women who were diagnosed with breast cancer (N=708) completed a unique module in which health-related quality of life (MOS SF-36, Ware & Sherbourne, 1992; CARES-SF, Schag, Ganz, & Heinrich, 1991) was assessed an average of four years following cancer diagnosis. The Social Network Index (SNI, Berkman & Syme, 1979) was included in a separate, earlier module. Results suggested that socially isolated women were more adversely affected by their breast cancer, with poorer role
functioning, vitality, and physical functioning than their more socially integrated counterparts. These data suggest that the mere presence of social relationships, the size of the social network, is related to more favorable physical and psychological outcomes.

*Functional Support.* The available literature suggests that functional social support also benefits cancer survivors. For instance, Parker and colleagues (2003) interviewed a heterogeneous sample (N=351; 30% breast, 31% gastrointestinal, 17% gynecologic, and 22% urologic) of cancer patients with a mean time since diagnosis of three years. They examined multiple aspects of psychological adjustment including depressive symptoms (CES-D, Radloff, 1977), anxiety symptoms (STAI, Spielberger et al., 1970), and psychological quality of life (MOS SF-12, Ware, Kosinski, & Keller, 1996). Results indicated elevated levels of depressive and anxiety symptoms and significant negative associations between depressive and anxiety symptoms and perceived social support (ISEL, Cohen et al., 1985). Helgeson, Snyder, and Seltman (2004) identified trajectories of physical and mental health functioning for in a sample of long-term breast cancer survivors (N=287) using a prospective, longitudinal design with follow-up 4.5 years post-diagnosis. They examined the relationship between quality of life (MOS SF-36, Ware & Sherbourne, 1992) and perceived social support (author-derived measure) and found that patients with poorer trajectories in terms of both mental and physical functioning had poorer perceived social support.¹ Schnoll, Knowles, and Harlow (2002) surveyed a heterogeneous sample of cancer survivors (N=109; breast 60%, prostate 20%, and other 19%) with a mean time since diagnosis of five years. Results demonstrated that multiple dimensions of perceived social support (ISEL, Cohen et al., 1985) were associated with better psychological health. Social

¹ Data included participants in a psychoeducation intervention, which had no impact on trajectory.
support appears to be associated with fewer symptoms of traumatic stress as well. For instance, Kornblith and colleagues (2003) found that perceived social support (MOS-Social Support Scale; Sherbourne & Stewart, 1991) was significantly negatively correlated with symptoms of distress (BSI; Derogatis & Spence, 1982) and PTSD symptoms (PCL-C; Weathers, et al., 1991) in a sample of 153 breast cancer survivors (mean time since diagnosis = 20 years). Andrykowski and Cordova (1998) and Andrykowski et al. (2000) obtained similar results in sample of breast cancer survivors (N=82, 3 years post-treatment and N=46, 30-42 months post-treatment, respectively). In both studies, presence of PTSD symptoms (PCL-C; Weathers et al., 1991) was significantly negatively correlated with social support (Duke Social Support Questionnaire, Duke-SSQ; Broadhead, Gehlbach, De Gruy & Kaplan, 1988).

The Stress-Buffering Hypothesis

The data linking social support to physical health and psychological well-being suggest that cancer-related health status is associated with elevated symptoms of psychological distress and traumatic stress for cancer survivors. Furthermore, the data demonstrate a powerful association between social support and survivorship outcomes. The nature of this relationship, however, remains unclear. Cohen and Wills (1985) have articulated a process through which social support has its beneficial effect on psychological outcomes that might unify the studies linking social support to better health outcomes and well-being. Known as the stress-buffering hypothesis, the theory stipulates that social support is related to well-being for persons subjected to stressors, such as chronic illness. The term buffering is used because it is believed that social support lessens the pathogenic effects of a stressor (see Figure 1). Essentially, social support is believed to have an impact on the relationship between the stressor and an adverse reaction by
altering the appraisal of an event as stressful, by directly changing the affective response to a stressor, or by providing resources for problem solving (Cohen, Gottlieb, & Underwood, 2001). Thus, the buffering effect is only seen in times of increased stress.

In general terms, this type of association, in which the relationship between two variables depends on the level of a third, is known as a moderator effect (Cohen, Cohen, West, & Aiken, 2002). The third variable – the stress buffer – is the moderator. Moderator relationships are tested statistically by examining the interaction between predictors. Thus, in order to test the stress-buffering hypothesis, one must include an interaction term in statistical analyses, either using analysis of variance (ANOVA) or multiple linear regression (MLR) models. Much of the stress-buffering literature since the late 1980s has focused on cardiac and endocrine responses to laboratory stressor tasks (see Cohen et al., 1997; Uchino, Caccioppo, & Kiecolt-Glaser, 1996). Although several studies claim to provide support for the stress-buffering hypothesis in the cancer and broader chronic illness literature, few studies provide specific tests of the hypothesis because they fail to include interaction terms in their statistical analyses (e.g., Penninx et al., 1998; Revenson, Wollman, & Felton, 1983). Still others test “stressors” that might be better construed as responses, such as intrusive thoughts (Devine, Parker, Fouladi, & Cohen, 2003). Such studies will not be considered here.

Two studies have tested the stress-buffering hypothesis in cancer samples. Koopman and colleagues (1998) used a cross-sectional design to test the phenomenon in a sample of 102 women with metastatic breast cancer recurrence. Average time since initial breast cancer diagnosis was four years. Specifically, the authors tested the hypothesis that social support moderates the relationship between stressful life events (Life Events Scale, LES; Horowitz,
Schaefer, Hiroto, Wilner, & Levin, 1977) and mood (Profile of Mood States, POMS; McNair, Lorr, & Droppleman, 1971). Social support was assessed using the Yale Social Support Index (Seeman & Berkman, 1988), a measure of perceived support, and a single-item measure of social network size (Blake & McCay, 1986). Scores were transformed and three subscales were created (method unspecified): number of supportive persons, positive support, and aversive support. Results were consistent with the stress-buffering hypothesis; with high life-stress, those with lower levels of aversive support and more persons in their social network experienced less mood disturbance. In fact, scores for mood disturbance were comparable to those with low levels of life stress. Manne et al. (2003) reported additional support for the buffering hypothesis among 140 recently diagnosed breast cancer patients. Using structural equation modeling, they demonstrated that perceived support from family and friends (Inventory of Socially Supportive Behaviors; Barrera, Sandler, & Ramsay, 1981) moderated the relationship between unsupportive partner behaviors (Perceived Negative Spouse Behavior Scale; Manne et al., 1997, Manne & Glassman, 2000) – the identified “stressor” – and avoidance symptoms (IES; Horowitz, Wilner, & Alvarez, 1979). Results indicated that, among women with lower perceived social support, partner unsupportive behaviors were significantly associated with avoidance symptoms; those behaviors were not associated with avoidance symptoms among women with high perceived support.

While not yet tested in cancer patients, the buffering effect of social support in the context of physical impairment has been demonstrated in arthritis patients. Affleck, Pfeiffer, Tennen, & Fifield (1988) found that perceived satisfaction with social support (Arizona Social Support Interview Schedule) moderated the relationship between functional disability and a measure of overall psychological adjustment, with social support providing more benefits with increasing levels
of disability (Affleck et al., 1988). Studies such as this, which include the appropriate statistical tests, are needed to assess the viability of the stress-buffering hypothesis in characterizing the aforementioned relationship between health status and psychological outcomes in gynecologic cancer survivors.

Focus of the Current Study

There is little data on the aspects of physical health that might influence quality of life for gynecologic cancer survivors. The available data from other cancer survivor samples suggest a strong association between cancer-related health status and psychological distress (Bjordal & Kaasa, 1995; Vickberg et al., 2000), global quality of life (Michael et al., 2002), and traumatic stress symptoms (Kornblith et al., 2003; Smith et al., 1999; Vickberg et al., 2001). While no studies have examined these relationships in gynecologic cancer, taken together the available data suggest that cancer-related health status constitutes a significant stressor for cancer survivors. In contrast, social support appears to provide benefits, for instance, a larger social network is associated with increased survival time (Waxler-Morrison et al., 1991) and better physical quality of life (Michael et al., 2002) in cancer survivors. Furthermore, perceived support is associated with fewer depressive and anxiety symptoms (Parker et al., 2003), fewer PTSD symptoms (Andrykowski et al., 2000; Andrykowski & Cordova, 1998; Kornblith et al., 2003), and improved quality of life (Helgeson, Snyder, & Seltman, 2004), though these relationships have not been tested in gynecologic cancer survivors. It is important to examine this relationship in gynecologic cancer survivorship in particular because of the challenging, persistent health difficulties and elevated psychological symptoms commonly seen.
In the present research, health status is conceptualized as the stressor. Health status is a multi-dimensional construct; thus, we will assess disruption in global health-related quality of life due to symptoms (MOS SF-12 Physical Component Score; Ware, Kosinski, & Keller, 1996), disease-specific quality of life (FACT subscale for each disease site; Cella, Tulsky, & Gray, 1994), symptoms/sign and treatment toxicities (SWOG; Moinpour, Feigl, Mecth, Hayden, Meyskens, & Crowley, 1989), performance status (Karnofsky Performance Status, KPS; Karnofsky & Burchenal, 1949), and specific symptoms such as vaginal changes and fatigue. Together, these measures span the breadth of physical functioning difficulties experienced by gynecologic cancer survivors. Relevant data from a breast cancer clinical trial demonstrate that the variables selected are only moderately correlated (r-values range from 0.35 to 0.59) and each captures a distinct dimension of health status that is important to the experience of the gynecologic cancer survivor.

Psychological distress and traumatic stress symptoms are outcomes. Distress measures include negative mood (Profile of Mood States, POMS; Guadagnoli & Mor, 1989), depressive symptoms (Center for Epidemiologic Studies Depression Scale, CES-D; Radloff, 1977), and mental health effects on quality of life (MOS SF-12 Mental Component Score; Ware, Kosinski, & Keller, 1996). Traumatic stress measures include the PTSD Symptom Checklist-Civilian version (PCL-C; Weathers et al., 1991) and the Impact of Events Scale (IES-R; Horowitz, Wilner, & Alvarez, 1979; Weiss & Marmar, 1996). Data from our other research with cancer survivors (Andersen et al., 2004) demonstrate that the variables selected for each construct are correlated. Variable intercorrelations among the psychological distress variables (POMS, CES-D, and SF-12 MCS) range from 0.73 to 0.79 (p<0.001); the correlation between scores on the PCL-C and IES-R (traumatic stress indices) is 0.77 (p<0.001). In contrast, the correlations between the psychological
distress and traumatic stress variables are of lesser magnitude, ranging from 0.39 to 0.58 (p<0.001), suggesting that these measures tap distinct underlying constructs.

The buffering hypothesis is tested with structural (Michael et al., 2002; Waxler-Morrison et al., 1991) and functional aspects of social support. Use of multiple social support measures is theoretically important. Cohen and Wills (1985) and Helgeson (2003) maintain that structural support demonstrates a linear relationship to psychological outcomes, while functional support demonstrates the buffering effect. The Social Network Index (SNI; Berkman & Syne, 1979), a measure of the size of the social network, will assess structural support. Functional support is assessed using the Perceived Social Support Scales, Friends and Family versions (PSS-Fr and PSS-Fa; Procidano & Heller, 1983) and the Interpersonal Support Evaluations List (ISEL; Cohen et al., 1985). When correlated, measures of structural and functional support are not highly related (Wethington & Kessler, 1986). Our other data confirm this (Andersen et al., 2004). Correlations between scores in the SNI and the PSS-Fr and PSS-Fa are 0.25 and 0.27, respectively. Three measures of functional support were chosen to tap different aspects of functional support – support from family (PSS-Fa), support from friends (PSS-Fr), and perceived availability of social resources (ISEL) with subscales for appraisal, tangible assistance, companionship, and esteem (see below for a more detailed discussion).

Control variables are also tested. For instance, age is a correlate of emotional distress (e.g., Michael et al., 2002; Parker et al., 2003) and traumatic stress symptoms (Andrykowski et al., 2000; Cordova et al., 1995; Vickberg et al., 2000) in cancer survivors, with younger women tending to experience elevated levels of distress. Markers of socioeconomic status have also been associated with psychological outcomes in gynecologic cancer (e.g., Chan et al., 2001; Cordova et
al., 1995; Gusberg & Runowicz, 1991; Meyerowitz, Formenti, Ell, & Leedham, 2000) and were therefore considered. It is also important to consider disease and treatment variables in testing models of psychological outcomes. Extent of treatment is generally dictated by severity of disease, as indicated by grade (i.e., differentiation of cancer cells) and stage (i.e., spread). As would be expected, receipt of surgery and adjuvant therapies is associated with various adverse psychosocial outcomes, such as poor physical functioning, pain, and quality of life in gynecologic cancer survivors (Eisemann & Lalos, 1999; Greimel et al., 2002; Lutgendorf et al., 2002).

Regarding health status, all therapies carry some long-term effects. Chemotherapy can result in persistent physiologic and sexual difficulties (Aziz, 2002; Wilmoth & Botchway, 1999); radiation therapy generally results in vaginal stenosis and necrosis (Flay & Matthews, 1995; Wilmoth & Botchway, 1999). Those sociodemographic and disease/treatment variables that are significantly correlated with outcomes are included in the appropriate HMLR models.

**Specific Aims**

This research tests the stress-buffering hypothesis in a sample of gynecologic cancer survivors. The research will also describe cancer-related quality of life for the sample and examine the association between cancer-related health status (i.e., physical sequelae of cancer treatment) and psychological distress and traumatic stress.

**Hypotheses**

1. It is hypothesized that the deleterious effects of health status deficits will be moderated by social support (see Figures 2 and 3). Further, it is hypothesized that functional support, but not structural support, will moderate the relationship between health status and psychological outcomes. This effect will be shown with multiple regression tests of the interaction between
the health status and social support predicting psychological distress and traumatic stress symptoms.

2. It is hypothesized that poorer cancer-related health status will be associated with increased levels of psychological distress and traumatic stress symptoms.

3. It is hypothesized that gynecologic cancer survivors will have substantial quality of life deficits (i.e., indicators of health status, psychological distress, and traumatic stress) compared to available norms.
CHAPTER 2

METHOD

Design

A cross-sectional design was used. Gynecologic cancer survivors (cervical, endometrial, ovarian, vulvar, and other vaginal cancers) were assessed one time during a clinic visit.

Eligibility

Subjects were previously treated at the Ohio State University-affiliated Arthur G. James Cancer Hospital and Richard J. Solove Research Institute for all stages (I-IV) and disease sites (cervix, endometrium, ovary, vagina, and vulva). The literature does not provide a standard recommendation on how to define the “survivor” population, thus we defined our population based on its clinical characteristics. Time since original diagnosis was restricted to 2 to 10 years post diagnosis. By two years, the acute stress of diagnosis has ended (Andersen, Anderson, & deProsse, 1989b) and patients have returned to their pre-cancer routines (Guidozzi, 1993; Klee, Thranov & Machin, 2000a; Klee, Thranov & Machin, 2000b). Women in the sample were anticipated to be representative, as five-year survival rates are 73% for cervix, 84% for uterus, and 45% for ovary (all races, all stages; Jemal et al., 2006). Beyond ten years, patients are in their mid-sixties and comorbidity might become common (Lethbridge-Cejku, Schiller, & Bernadel, 2004), making it more difficult to attribute quality of life concerns to their cancer, per se.
Exclusion criteria were: male (only women have gynecologic cancer), initial treatment <2 years or >10 years at the time of assessment, age <20 and >75, prior non-gynecologic cancer diagnosis, refusal of any prior cancer treatment, organic brain syndrome, significant hearing deficit, major mental illness (e.g. schizophrenia), mental illness which is not being treated/controlled (e.g. bipolar disorder), mental retardation, deficient ability to speak/read the English language, dementia, and/or current pregnancy.

Subjects

A summary of descriptive statistics can be found in Table 2. Of the 260 of the women eligible to participate, most were diagnosed with early-stage (I or II) disease. Disease sites included the cervix (n=47), endometrium (n=133), ovary (n=66), peritoneum (n=3), vulva (n=7), and vagina (n=4). For the present analyses, patients with peritoneal disease were grouped with ovarian cancer patients because their prognostic and treatment indicators are comparable; vaginal cancer patients were grouped with vulvar patients for the same reasons (Berek & Hacker, 2005). At the time of the assessment, participants ranged in age from 23 to 83 years and nearly all were post-menopausal. The majority had a spouse or live-in romantic partner. All but 12 participants were Caucasian (1 Hispanic woman, 4 Asian Americans, 7 African Americans). Slightly more than half of participants had attended some college and slightly less than half were employed full- or part-time. Annual household income distribution was <$15,000=12%; $15,000 to $29,000=18%; $30,000 to $49,000=23%; $50,000 to $79,000=23%; and >$79,000=26%, with an overall median of $45,000 (SD=$320,476, range $1,000 to $5,000,000).
Procedures

Gynecologic cancer survivors meeting eligibility criteria were identified using the medical center scheduling system (see Figure 4 for details of accrual). Two weeks prior to scheduled appointments, patients received a letter providing a written description of the study – including purpose, time commitment, procedures, and risks and benefits of the study. Informed consent was completed in person at the clinic appointment and was documented by signature on forms approved by the Institutional Review Board (IRB protocol 2004BO342).

Interviews lasted 60 to 90 minutes and were conducted individually in consultation rooms available in outpatient gynecologic oncology offices. Daily check-ins were conducted with the assessors to discuss difficulties in completing the interviews and provide strategies for research personnel to assist patients with miscellaneous needs. Data from subjects include interview responses, self-report inventories, relevant medical chart data (e.g. diagnosis, treatment), and medical evaluations. All data were coded by subject number and only immediate members of the research group had access to the name/number code during data collection. Every effort was taken to minimize psychological stress, embarrassment, or discomfort, including extensive training of assessors. All women were provided with written and verbal information about the psychosocial services normally available at the cancer hospital. No patient made a special request (e.g. to see a consulting psychiatrist). Subjects received $25 for time and effort.

Measures

Health Status

General Health-Related Quality of Life. The Physical Component Summary score of the Medical Outcomes Study-Short Form 12 was used to assess health-related physical quality of life
(SF-12; Ware & Sherbourne, 1992; Ware, Kosinski, & Keller, 1996). The SF-12 assesses eight aspects of quality of life including physical functioning, role functioning-physical, bodily pain, general health perceptions, vitality, social functioning, role functioning-emotional, and mental health. Higher scores reflect better quality of life. The eight primary subscales are summarized into two component scores: the Physical Component Summary (PCS) and the Mental Component Summary (MCS). The SF-12 demonstrates adequate reliability and validity when compared to other similar measures of health-related quality of life. For instance, correlations between scores on the SF-12 and SF-36 range from 0.93 to 0.97. Internal consistency, test-retest reliability, and convergent and discriminant validity coefficients for the SF-12 are similar to those of the SF-36. Two-week test-retest reliability ranges from 0.86 to 0.89 for the PCS (Ware, Kosinski, & Keller, 1996). The SF-12 discriminates between healthy and illness groups and between groups with high and low psychological distress in community samples (Schofield & Mishra, 1998). It has also been validated for use with low-income, minority samples (Franks, Lubetkin, Gold, & Tancredi, 2003) and older adults (Pettit et al., 2001). The SF-12 is frequently used for studies of chronic illness populations including chronic pain patients (Riddle, Lee & Stratford, 2001), cardiac patients (Bennett et al., 2002, Dempster & Donnelly, 2001), HIV patients (Delate & Coons, 2000), migraine patients (Lipton et al., 2000), and psychiatric inpatients (Salyers, Bosworth, Swanson, Lamb-Pagone, & Osher, 2000). Coefficient $\alpha$ for the present study is 0.91.

**Disease-Specific Quality of Life.** The Functional Assessment of Cancer Therapy (FACT; Cella, Tulsky, & Gray, 1994) is a family of instruments developed to examine quality of life outcomes in the context of cancer. A number of site- and symptom-specific quality of life scales have been developed, including the FACT-Cx for use with cervical cancer patients, FACT-En for
endometrial cancer patients, FACT-O for ovarian cancer patients, and FACT-V for vulva patients. Each subscale contains items that reflect the various aspects of coping with a specific cancer. In the present study, these subscales will be used to assess disease-specific quality of life. Patients endorse each item based on their experience of each symptom/event during the past seven days. Items are rated on a 5-point Likert scale, ranging from 0=not at all to 4=very much. Following reverse-scoring of negatively valenced items, responses are weighted and summed. Higher scores reflect better quality of life. Reliability studies of the FACT-O indicate 8-week test-retest reliability of 0.81 and internal consistency (alpha) of 0.92 for the subscale. Tests of convergent and criterion-related validity indicate that the subscale performs as expected with regard to other measures of QoL, mood, and performance status (Basen-Engquist et al., 2001). Reliability and validity of the FACT-V have been reported by Janda and colleagues (2005). They report internal consistency of 0.92 (α) adequate discriminant and divergent validity as well. There are currently no published data available on the reliability and validity of the FACT-Cx, but it has been used extensively in recent clinical trials (Long et al., 2006; McQuellon, Thaler, Cella, & Moore, 2006; Monk, Huang, Cella, & Long, 2005). Coefficient α's for the present study are 0.83, 0.79, 0.73, and 0.81 for the FACT-Cx, FACT-En, FACT-O, and FACT-V, respectively.

**Fatigue.** The degree of fatigue was assessed using the Fatigue Symptom Inventory-Revised (FSI: Hann et al., 1998). The FSI is a 14-item measure designed to assess the frequency, severity, and daily pattern of fatigue as well as its impact on ratings of quality of life during the previous week. In the present study, the seven items that comprise the Total Disruption Index (TDI) score were used. Patients rate the degree to which fatigue interfered with a variety of activities during the past week using a 11-point Likert scale, ranging from 0=no interference to
Scores are calculated by summing the responses to each of the items and range from 0 to 70, with higher scores indicating greater interference. Hann and colleagues (1998) have reported alpha coefficient reliabilities above 0.90 across three groups of women (no history of breast cancer, completed treatment for breast cancer, and active treatment for breast cancer). They have also reported adequate convergent validity for the FSI, with correlations between the TDI and other measures of fatigue and vitality ranging from 0.61 to 0.78 in cancer and healthy groups (Hann et al., 1998). Coefficient $\alpha$ for the present study is 0.93.

**Signs/Symptoms and Treatment Toxicities.** The Southwest Oncology Group (SWOG; Moinpour, Feigl, Metch, Hayden, Meyskens, & Crowley, 1989) criteria were used to document types and severity of current signs/symptoms of toxic reactions to treatment. Self-reports of signs/symptoms of toxicity for the four body systems most relevant to gynecologic disease are provided: Renal/Bladder, Gastrointestinal, Endocrine, and Mucosal. Patients provide severity ratings based on a five-point scale unique to each symptom. For example, the scale for gastritis/ulcer (a Gastrointestinal item) includes 0 = none; 1 = antacid required; 2 = requires vigorous medical mgmt, no surgery; 3 = requires surgery for ulcer, and 4 = perforation, bleeding. Subscale scores reflect the calculated average of the items for each body system; scores range from 0 to 4, with higher scores indicating more life-threatening symptoms. The subscale scores are summed to obtain an overall toxicity score. The total score ranges from 0 to 16, with a score of 16 indicating life-threatening symptoms in each of the four body systems. When necessary and appropriate, supporting information was obtained through consultation with medical staff or chart review. Data from our prior studies of gynecologic cancer patients indicate internal consistency of 0.70 (Carpenter, 2002). Six-month test-retest reliability in our studies of breast cancer patients who
have completed treatment ranges from 0.67 to 0.73 (sample reported in Andersen et al., 2004). Coefficient $\alpha$ for the present study is 0.68 for the total score, which would be expected given the heterogeneity of the subscales.

**Vaginal Changes.** To our knowledge, there are no standardized measures of vaginal changes following gynecologic cancer treatment, so a representative list was generated from the gynecology literature and advice of physician collaborators. Patients were queried about five common vaginal sequelae of treatment (e.g., shortening or narrowing, dryness). In each case, the presence (scored 1) or absence (scored 0) of the item was reported. A total score that estimates the degree of vaginal changes was obtained by summing the items, thus the total score ranges from 0 to 5, with a score of 5 indicating more vaginal symptoms. Reliability and validity of this newly developed measure were assessed. Coefficient $\alpha$ for the present study is 0.71. Regarding convergent and discriminant validity, the vaginal changes score correlates only moderately with other measures of health status: $r=0.21$ with the FSI ($p=0.001$), $r=0.36$ with the SWOG ($p<0.001$) and minimally with measures of psychological distress, e.g., $r=0.17$ with the CES-D ($p=0.005$) and $r=0.11$ with the POMS total mood disturbance score ($p=0.07$).

**Performance Status.** Functional performance was assessed using the Karnofsky Performance Status rating (Karnofsky & Burchenal, 1949), which is the most widely used measure of functional status in cancer studies. The scale ranges from 100 (Normal, no complaints, no evidence of disease) to 0 (Dead) with 10-point intervals, each containing differential criteria (e.g., 90=able to carry on normal activity, minor signs/symptoms of disease; 80=normal activity with effort, some signs/symptoms of disease). The lower the score, the more restricted the patient is in the performance of daily and self-care activities. Across cancer studies interrater reliability for the
scale ranges from 0.70 to 0.97 (Mor, Laliberte, Morris, & Wiemann, 1984; Wood, Anderson, & Yates, 1981) and many studies have demonstrated predictive validity with significant and high correlation with cancer endpoints (e.g. death, treatment toxicities, etc; Ganz et al., 1988). Project assessors provided Karnofsky ratings following completion of the Southwest Oncology Group signs/symptoms and toxicities interview and chart review.

**Psychological Distress**

*Mood.* The 14-item short form of the Profile of Mood States (POMS; Guadagnoli & Mor, 1989) was used to assess mood over the past seven days. The measure is based on the original 65-item POMS (McNair, Lorr, & Droppleman, 1971) and was developed for use with cancer patients. Patients report how they have felt during the past week on a 5-point Likert scale ranging from 0=not at all to 4=extremely. The measure includes a 7-item positive affect subscale (e.g., good-natured), a 7-item negative affect subscale (e.g., panicky), and a 14-item total mood disturbance score. The total score is the sum of the subscale scores (with positive items reverse-scored). It ranges from 0 to 28, with higher scores representing greater mood disturbance. No clinical cutoff score has been established in the literature. The correlation between scores on the short form and 65-item POMS (alternate-form reliability) is high in our studies ($r=0.82$), consistent with previous research (Guadagnoli & Mor, 1989). Internal consistency, test-retest reliability, and convergent and discriminant validity coefficients for the short form are comparable to those of the long form. Internal consistency in our breast cancer studies is 0.82 for the Negative Affect subscale, 0.80 for the Positive Affect scale, and 0.83 for the Total Mood Disturbance score. Coefficient $\alpha$ for the present study is 0.81 for the Total Mood Disturbance score.
Depressive Symptoms. The Iowa short form of the Center for Epidemiological Studies Depression Scale (CES-D; Comstock & Helsing, 1976; Radloff, 1977; Kohout, Kinan, Evans, & Cornoni-Huntley, 1993) was used to identify current symptoms of depression. This short form of the CES-D consists of 11 items (e.g. “I felt everything I did was an effort,” “I felt sad”) rated on 3-point Likert scales from 0=hardly ever or never to 2=much or most of the time. Women respond based on their feelings during the previous week. Following reverse scoring of positively valenced items, all items are summed with total scores ranging from 0 to 22. Higher scores reflect greater depressive symptoms. Authors recommend a cut-off score of 8 for identifying patients with clinical depressive symptoms (Kohout et al., 1993). Authors report internal consistencies (α) ranging from 0.71 to 0.88 and high correlations with the original 20-item measure, ranging from 0.88 to 0.93, across various samples (Carpenter et al., 1998). Internal consistency reliability was 0.90 in a prior study of gynecologic cancer patients and 12-month test-retest reliability is 0.47 (Carpenter, 2002), consistent with prior research (Himmelfarb & Murell, 1983; Kohout et al., 1993). Unlike other measures of depressive symptoms, the CES-D is relatively unaffected by physical symptoms and is, therefore, commonly used in research with medical patients (Devins et al., 1988). Coefficient α for the present study is 0.82.

General Health-Related Quality of Life. The Mental Component Summary score of the Medical Outcomes Study-Short Form 12 was used to assess health-related physical quality of life (SF-12; Ware & Sherbourne, 1992; Ware, Kosinski, & Keller, 1996). The SF-12 assesses eight aspects of quality of life including physical functioning, role functioning-physical, bodily pain, general health perceptions, vitality, social functioning, role functioning-emotional, and mental health. Higher scores reflect better quality of life. The eight primary subscales are summarized
into two component scores: the Physical Component Summary (PCS) and the Mental Component Summary (MCS). The SF-12 MCS demonstrates adequate reliability and validity when compared to other similar measures of health-related quality of life. No clinical cutoff score has been established in the literature. Two-week test-retest reliability ranges from 0.76 to 0.77 for the MCS (Ware, Kosinski, & Keller, 1996). See above for additional information about the measure. Coefficient $\alpha$ for the present study is 0.91.

**Traumatic Stress**

*Cancer-Related Traumatic Stress.* The Impact of Events Scale – Revised (IES-R; Horowitz, Wilner, & Alvarez, 1979; Weiss & Marmar, 1996) is a 22-item standardized self-report questionnaire that was used to assess reactions to cancer diagnosis and treatment. Factor analytic studies indicate that the measure examines three factors: intrusive thoughts (i.e., “I had dreams about being a cancer patient”), avoidant thoughts/behaviors (e.g., “I tried not to talk about it”), and hyperarousal (e.g., “I was jumpy and easily startled”). Women rated the frequency of these feelings or events during the previous week, using a five-point Likert scale ranging from 0=not at all to 4=extremely. Items were summed for a total score that ranges from 0 to 88, with higher scores reflecting greater cancer-related distress. Authors recommend a cut-off score of 33 for identifying patients with clinical symptoms of Posttraumatic Stress (Weiss & Marmar, 1996; Shapinsky, Rapport, Henderson, & Axelrod, 2005). In our studies, coefficient alpha reliability is 0.83, consistent with other studies reporting reliabilities of 0.78 to 0.83 (Cordova et al., 1995, Horowitz et al., 1979; Schwartz, Lerman, Miller, Daly, & Masny, 1995). Two-week test-retest reliability is 0.79 and 0.89 (Horowitz et al., 1979). Coefficient $\alpha$ for the present study is 0.93.
Traumatic Stress. The PTSD Checklist-Civilian Version (PCL-C) was used to assess PTSD symptomatology. The measure is intended for civilian (i.e., noncombat) populations (Weathers et al., 1991) and has been utilized to assess PTSD symptoms in breast cancer survivors (Andrykowski & Cordova, 1998; Cordova et al., 1995). The PCL-C consists of 17 items, each corresponding to a specific DSM-IV PTSD symptom. When completing the PCL-C, women will be asked to consider “a stressful experience” and rate how much each symptom has bothered them in the last month. For example, one item asks respondents to indicate how much they have been bothered by “repeated, disturbing memories of a stressful experience in the last month.” Respondents use a 5-point Likert scale, ranging from 1=not at all to 5=extremely for each item. The PCL-C yields a total score by summing the 17 item scores (range = 17 to 85). Authors recommend a cut-off score of 50 for identifying patients with clinical symptoms of Posttraumatic Stress (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). Internal consistency for the PCL-C total score is 0.90, as indexed by coefficient alpha, was reported by Andrykowski et al. (1998) in this population. Coefficient α for the present study is 0.94.

Structural Social Support

Social Involvement. The Social Network Index (SNI; Berkman & Syme, 1979) is a 16-item measure of the number of an individual’s social ties as well as his or her involvement within this network. The SNI was developed based on the relationship between social ties and mortality using the 1965 Human Population Laboratory Survey of a random sample of 6,928 adults in Alameda County, California and a subsequent nine-year mortality follow-up. The relative mortality risks associated with a low rank on the SNI were greater than those of any single network measure (i.e. marital status) or of a combined measure of marital status and contacts with friends and relatives
The final Social Network Index is composed of four major components: marital status, number of close friends and relatives and frequency of monthly contact with these individuals, church group membership, and membership in other groups (social, vocational, child-related, service-oriented, other). Intimate contacts are weighted more heavily than church affiliations and group memberships in the calculation of the SNI. Social Network scores range from 1 to 12, with higher scores representing greater social involvement. These scores can be divided among four categories ranging from low to high social connection: Low SNI =1, Medium SNI = 2 to 5, Medium/High SNI = 6 to 7 and High SNI = 8 to 12. In order to achieve a low score, an individual must have a very limited number of intimate contacts and limited group membership. To be classified as having a High SNI, an individual must have several intimate contacts (regardless of group memberships) or a moderate number of intimate contacts with both church and group membership. In our studies of breast cancer patients, internal consistency is 0.62 and four-month test-retest reliability 0.71 (Andersen et al., 2004). Coefficient $\alpha$ for the present study is 0.48, which would be expected given the heterogeneity of item content.

**Functional Social Support**

**Perceived Support.** Modified versions of the Perceived Social Support from Friends (PSS-Fr) and Perceived Social Support from Family (PSS-Fa) scales were used. Each 20-item instrument was designed to measure the degree to which patients’ needs for support were fulfilled by their network of friends and family. Sample items include, “My friends give me the moral support I need,” for the Friends subscale, and “I have a deep, sharing relationship with a number of members of my family,” for the Family subscale. Responses are $0=\text{no}$ or $1=\text{yes}$. Scale scores range from 0 to 20 for the PSS-Fr and PSS-Fa, with higher scores reflecting more perceived social
support. The PSS scales have excellent internal consistency. Alphas for the PSS-Fa range from 0.88 to 0.91 and 0.84 to 0.90 for the PSS-Fr. Test-retest reliability over a one-month period was 0.83. Factor analysis suggests that the family and friend items load on separate factors (Procidano & Heller, 1983). Coefficient α for the present study is 0.89 for the PSS-Fa and 0.92 for the PSS-Fr.

Perceived Availability of Social Resources. The Interpersonal Support Evaluations List (ISEL; Cohen et al., 1985), a 40-item measure of perceived social support, was used. Responses are 1=false and 2=true. Items are summed for each scale score; scale scores range from 40 to 80. The ISEL provides subscales for the perceived availability of each of the following types of support resources: 1) Appraisal Support, i.e., availability of someone with whom problems can be discussed; 2) Tangible Support, i.e., availability of material aid; 3) Belonging Support, i.e., companionship; and 4) Esteem Support, i.e., evaluating one’s self as positive when comparing the self with others. Cohen et al. (1985) report that the internal consistency of the scales range from 0.60 to 0.92, and the scales are not overlapping (0.24, ns). Four-week-test-retest reliability is 0.87 for the total scale. Coefficient α for the total score in the present study is 0.88, subscales α’s range from 0.67 to 0.79.

Analytic Strategy

Descriptive Data

Descriptive data characterize the sample and include sociodemographic status, disease and treatment variables, health status, psychological distress, and traumatic stress. Available normative data are used for psychological distress and traumatic stress measures. Correlations
between these variables and the outcome variables are examined. Variables significantly correlated with the outcome variables are included in the regression analyses.

*Score Calculation*

For ease of analysis and interpretation, composite scores for health status, psychological distress, and traumatic stress were calculated for the regression analyses. The indices of health status included the SF-12 PCS, FACT, FSI, SWOG, vaginal changes scale, and KPS (psychometric properties for each measure provided above). Data from the present study demonstrate that the variables selected for this index are minimally to moderately correlated with one another (r-values range from 0.085 to 0.687, see Table 3), suggesting that variables capture distinct dimensions of health status.

The indices of psychological distress (POMS, CES-D, and SF-12 MCS) and traumatic stress (PCL-C and IES-R) were similarly combined into composite scores. Data from the present study suggest moderate correlations among the psychological distress variables (POMS, CES-D, and MOS SF-12 MCS), ranging from 0.583 to 0.661 (p<0.01); the correlation between scores on the PCL-C and IES-R (traumatic stress indices) is 0.529 (p<0.01) in the present sample. In addition, the correlations between the psychological distress and traumatic stress variables are generally of lesser magnitude, with absolute values ranging from 0.281 to 0.545 (all p<0.01). The composites were calculated using four steps. First, each measure was scored as directed by the authors. Then, standardized scores were calculated. Third, standard scores were reversed as appropriate to insure that all scales were scored in the same direction, e.g., a high score on each measure of health status indicated poorer functioning before the composites were calculated. Finally, for each composite index, the average of the relevant standardized scores was computed.
Correlations between health status and psychological distress ($r=0.460$, $p<0.01$), health status and traumatic stress ($r=0.390$, $p<0.01$), and psychological distress and traumatic stress ($r=0.556$, $p<0.01$) are significant, but in the moderate range, indicating that three distinct constructs are being assessed.

The health status composite served as the predictor in subsequent HMLR analyses; the psychological distress and traumatic stress composites served as outcomes (see Figures 2 and 3). The social support predictor variables (SNI, PSS-Fr, PSS-Fa, and ISEL), were also standardized prior to conducting the regression analyses to insure that all regression coefficients were centered and therefore interpretable (Preacher, 2003). When predictor variables are standardized, the unstandardized regression beta coefficients can be interpreted as unit changes from the sample mean of a particular variable, as opposed to an arbitrary value of zero (Cohen et al., 2002).

**Regression Analyses**

A series of eight hierarchical multiple linear regression (HMLR) equations were used to test the moderation effect of social support. In total, two sets of regression models are tested, one set for the psychological distress outcome and one set for the traumatic stress outcome. Each set includes four model tests, one for each social support variable: SNI, PSS-Fr, PSS-Fa, and ISEL. Use of separate tests for each social support variable allows examination of differential effects based on type and source of social support offered. Variables were entered as hypothesized:

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable(s) Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sociodemographic variables – age, SES</td>
</tr>
<tr>
<td>2</td>
<td>Disease/treatment -- site, stage, radiation therapy (yes vs. no), chemotherapy (yes vs. no)</td>
</tr>
<tr>
<td>3</td>
<td>Months since diagnosis</td>
</tr>
<tr>
<td>4</td>
<td>Health status</td>
</tr>
<tr>
<td>5</td>
<td>Social support (SNI or PSS-Fr or PSS-Fa or ISEL)</td>
</tr>
<tr>
<td>6</td>
<td>Health status X social support</td>
</tr>
</tbody>
</table>
Thus, the final MLR model, assuming no control variables, takes the form:

$$Y=b_0 + b_1(X) + b_2(Z) + b_3(XZ) + e,$$

where $Y$=psychological distress or traumatic stress, $b$=intercept, $X$=cancer-related health status, and $Z$=social support, and $XZ$=the cross-product of health status and social support. The $b$-values represent beta weights for each variable; $b_3$ can thus be interpreted as the amount of change in the slope of the regression of $Y$ on $X$ when $Z$ changed by one unit.

**Simple Slopes Analysis**

For HMLR with significant interaction terms, simple slopes analyses facilitate qualitative interpretation of the interaction. To calculate the simple slope and plot them for interpretation, values one standard deviation above and below the mean of $Z$ are used for high and low lines. The minimum and maximum values of $X$ are used to anchor the lines (Cohen et al., 2002). The standard error of each simple slope is calculated:

$$Sb = \sqrt{s_{11} + 2Zs_{13} + (Z)^2s_{33}},$$

where $s_{11}$ is the variance of the $X$ coefficient, $s_{33}$ is the variance of the interaction coefficient, and $s_{13}$ is the covariance of the two. A t-test of the simple slope divided by this standard error with $(N-k-1)$ degrees of freedom determines whether the simple slope differs significantly from zero. Whether two simple slopes are different from one another cannot be tested statistically; however, a significant p-value for the interaction term implies that all pairs of simple slopes are necessarily different from one another (Cohen et al., 2002; Preacher, 2003).
CHAPTER 3

RESULTS

Preliminary Analyses

Correlational analyses revealed that age and years with partner were the only sociodemographic variables that were significantly correlated with the psychological distress and traumatic stress outcomes (age: $r=-0.321$, $p<0.01$ with psychological distress and $r=-0.231$, $p<0.01$ with traumatic stress; years with partner: $r=-0.233$, $p<0.01$ with psychological distress and $r=-0.151$, $p<0.05$ with traumatic stress). As these two variables are highly correlated ($r=0.708$, $p<0.001$), only age was selected as a control variable for the HMLR models.

One-way ANOVAs indicated that disease site groups significantly differed on the following disease and treatment variables: stage ($X^2(9,n=252)=84.46$, $p<0.001$), grade ($X^2(9,n=237)=42.02$, $p<0.001$), receipt of hysterectomy ($X^2(3,n=260)=60.40$, $p<0.001$), receipt of radiation ($X^2(3,n=260)=40.74$, $p<0.001$), and receipt of chemotherapy ($X^2(3,n=260)=39.97$, $p<0.001$). See Table 2 for a complete summary. Women in the ovarian group were more likely to have advanced disease than women in the cervical, endometrial, or vulvar groups, as indicated by stage (i.e., larger tumors or lymph node involvement) and grade (e.g., poorer differentiation of cells), which represents the typical presentation (Averette & Nguyen, 1995). Consistent with the observed differences and with standard treatment protocols (see Berek & Hacker, 2005), treatment modalities differed among groups. In addition, correlational analyses revealed that months since...
diagnosis was significantly correlated with psychological distress ($r = -0.140, p < 0.05$) and receipt of hysterectomy was significantly correlated with traumatic stress ($r = -0.140, p < 0.05$); therefore, these variables were included in the appropriate HMLR models.

One-way ANOVAs were also used to examine potential relationships between site and the predictor (physical health status and social support) and outcome (psychological distress and traumatic stress) variables. Correlational data and summary statistics can be found in Tables 2 and 3. The only observed group differences were for the vaginal changes scale ($F(3,255)=11.22$, $p<0.001$), signs/symptoms and toxicities ($F(3,256)=3.14$, $p=0.03$), and the SF-12 MCS ($F(3,254)=2.83$, $p=0.04$). A series of post hoc Bonferroni tests probed the nature of the group differences. Tests for the vaginal changes scale indicated that women in the vulvar group were more likely to experience vaginal changes than women in any other group and cervical patients were more likely to experience them than women from the ovarian or vulvar groups, all of which was consistent with extent of surgery. Women from the cervical cancer group were also more likely to experience current signs/symptoms and treatment toxicities than women from the endometrial and ovarian groups, consistent with their increased likelihood of receiving radiation therapy. Post hoc tests of the significant SF-12 MCS result indicated that no site-based comparisons were significant (all $p$’s$>0.10$). Because the observed health status differences were consistent with the observed differences in treatment approach, site was not used as a control variable in the HMLR analyses.
Regression Analyses

Psychological Distress Outcome

The results of the regressions examining the psychological distress outcome are summarized in Tables 5, 6, 7, and 8. Briefly, all models were significant and accounted for a substantial portion of the variance in psychological distress, 37% for the model testing the SNI (structural support), 36% for the model testing PSS-Fa (perceived support from family), 37% for the model testing PSS-Fr (perceived support from friends), and 37% for the model testing the ISEL (perceived availability of social resources). Furthermore, the health status composite was a significant unique predictor of psychological distress in each model. In each case, results indicated that patients with poorer health status experienced more psychological distress. In addition, those with better social support, as indicated by relatively higher social involvement (SNI), better support from family (PSS-Fa), better support from friends (PSS-Fr), and higher perceived availability of social resources (ISEL), reported less psychological distress than their counterparts reporting poorer social support. In all cases the test of the moderator (health status X social support interaction term) was null (all $p$'s>0.08).

Traumatic Stress Outcome

The results of the regressions examining the traumatic stress outcome are found in Tables 9, 10, 11, and 12. The full model testing the interaction between health status and the SNI (structural support) was significant, $F(5,181)=10.85$, $p<0.001$, and accounted for 23% of the total variance in traumatic stress symptoms. In the final model, the health status composite was a significant unique predictor of traumatic stress symptoms ($p<0.001$); the SNI score and interaction term were not ($p=0.25$ and $p=0.33$, respectively). Results indicated that patients with poorer health
status were more likely to experience traumatic stress symptoms than patients with better health status. There was no evidence for a direct relationship between traumatic stress and social involvement, nor did the SNI score moderate the relationship between health status and traumatic stress.

The full model testing the interaction between health status and the PSS-Fa (perceived support from family) was significant, $F(5,254)=14.16$, $p<0.001$, and accounted for 22% of the total variance in traumatic stress symptoms. In the final model, the health status composite was a significant unique predictor of traumatic stress symptoms ($p<0.001$); the PSS-Fa score and interaction term were not significant ($p=0.41$ and $p=0.19$, respectively). Again, results indicated that patients with poorer health status were more likely to also experience traumatic stress symptoms. There was no evidence for a direct relationship between traumatic stress and perceived support from family. Furthermore, the PSS-Fa score did not moderate the relationship between health status and traumatic stress.

The full model testing the interaction between health status and the PSS-Fr (perceived support from friends) was significant, $F(5,252)=16.45$, $p<0.001$, and accounted for 25% of the total variance in traumatic stress symptoms. In the final model, the health status composite and interaction term were significant unique predictors of traumatic stress symptoms ($p<0.001$ and $p=0.007$, respectively); interestingly, the PSS-Fr score was not ($p=0.76$). Results indicated that, as above, patients with poorer health status were more likely to also experience symptoms of traumatic stress, but these data provided no evidence for a direct relationship between perceived support from friends and traumatic stress symptoms. The significant interaction term provided evidence for stress buffering; that is, the PSS-Fr score did moderate the relationship between
health status and traumatic stress symptoms. A follow-up simple slopes analysis was conducted. The t-tests of the simple slopes for the low and high PSS-Fr lines were significantly different from zero, $t(253)=7.38$, $p<0.05$ and $t(253)=4.07$, $p<0.01$, respectively. See Figure 5. The plot of the interaction shows that, while traumatic stress scores were approximately equivalent for patients with “good” health status, for those with “poor” health status, individuals with “high” perceived support from friends reported fewer traumatic stress symptoms.

The full model testing the interaction between health status and the total ISEL score (perceived availability of social resources) was significant, $F(5,254)=14.92$, $p<0.001$, and accounted for 23% of the total variance in traumatic stress symptoms. In the final model, the health status composite and interaction term were significant unique predictors of traumatic stress symptoms ($p<0.001$ and $p=0.03$, respectively); the total ISEL score was not ($p=0.77$). As with the PSS-Fr, results indicated that patients with poorer health status were more likely to also experience symptoms of traumatic stress. Once again, these data provide no evidence for a direct relationship between perceived availability of social resources and traumatic stress symptoms, though the significant interaction term provided evidence for stress buffering; that is, ISEL total score did moderate the relationship between health status and traumatic stress symptoms. The results of the simple slopes analysis for the ISEL mirror those for the PSS-Fr (see Figure 6). The t-tests of the simple slopes for the low and high ISEL lines were significantly different from zero, $t(255)=6.48$, $p<0.01$ and $t(255)=3.73$, $p<0.01$, respectively. As the plot of the interaction demonstrates, traumatic stress scores are low and approximately equivalent for patients with “good” health status, regardless of social support, while those with “poor” health status reported fewer traumatic stress symptoms with “high” perceived availability of social resources.
Post Hoc Analyses

Because the ISEL subscales provide additional insight into the facets of social support that might be important in this context, separate HMLR models were also used to test each of the four ISEL subscales – Appraisal, Belonging, Esteem, and Tangible Support – predicting traumatic stress outcomes. A complete summary of these results can be found in Table 13.

The pattern of results for the ISEL appraisal and belonging subscales was identical to that of the full-scale ISEL score. Results indicated that that patients with relatively poor health status reported more traumatic stress symptoms than those with good health status. In addition, patients with higher perceived availability of confidants (ISEL-appraisal) and companionship resources (ISEL-belonging) reported fewer symptoms than those with low perceived availability of these resources. In these models, the interaction terms were also statistically significant, $p=0.04$ for appraisal and $p=0.002$ for belonging; thus, the ISEL-appraisal and belonging subscale scores did moderate the relationship between health status and traumatic stress symptoms, providing evidence for stress buffering. See Figures 7 and 8 for interpretation of the respective simple slopes analyses. The t-tests of the simple slopes indicated that the slopes of the low and high appraisal subscale lines were significantly different from zero, $t(255)=6.85$ and $t(255)=4.16$, respectively ($p'$s<0.01). As the plot of the interaction demonstrates, traumatic stress scores were lower and approximately equivalent for patients with “good” health status. With “poor” health status, while individuals with “high” perceived availability of confidants reported fewer traumatic stress symptoms than did patients reporting “low” access to confidants. Regarding the belonging subscale, the t-tests of the low line was as above, indicating that the slope was significantly different from zero, $t(255)=2.71$ ($p<0.01$); however, the test of the high belonging line was not
significant, \( t(255)=1.35 \), indicating that the slope of this line did not differ from zero. As the plot demonstrates, patients with “low” perceived availability of companionship resources reported low levels of traumatic stress with “good” health status, but higher levels of traumatic stress with “poor” health status, whereas patients with “high” perceived companionship reported lower levels of traumatic stress, regardless of their health status.

Results of the HMLR models testing the ISEL esteem and tangible subscales indicated that patients with relatively poor health status reported more traumatic stress symptoms than those with good health status, as expected; however, esteem and tangible support were not significant unique predictors of traumatic stress symptoms, nor were the interaction terms statistically significant, \( p=0.44 \) and \( p=0.17 \), respectively. This suggests that the personal reflection on one’s social support (ISEL-esteem) and perceived availability of material aids (ISEL-tangible) were not related to levels of traumatic stress in this sample. In addition, the ISEL-esteem and tangible subscales did not moderate the relationship between health status and traumatic stress.
CHAPTER 4

DISCUSSION

The present study tested the stress-buffering hypothesis in a sample of gynecologic cancer survivors. Using Cohen and Willis’s (1985) original conceptualization, the contributions of the structural and functional aspects of social support were tested. In order to do so, this research examined the association between cancer-related health status (i.e., physical sequelae of cancer treatment) and psychological outcomes (psychological distress and traumatic stress). It was hypothesized that patients would evidence compromised health status and quality of life compared to available norms and that relatively poor cancer-related health status would be associated with poor psychological outcomes (i.e., increased levels of psychological distress and traumatic stress symptoms). It was also hypothesized that the deleterious effects of health status deficits would be moderated by functional, but not structural social support.

Briefly, the hypothesis that patients in this sample would evidence compromised health status was supported. Physical quality of life scores were generally in the range of cancer patients in active treatment or short-term follow-up and assessment of particular physical symptoms revealed a variety of longstanding health status deficits in this sample. These patients did not evidence exceptionally high levels of psychological distress or traumatic stress, though a significant proportion (8 % to 15%) reported symptoms in the clinically significant range. Furthermore, the hypothesis that poorer cancer-related health status would be associated with poorer psychological
outcomes was unequivocally supported; these data demonstrated that cancer-related health status constitutes a significant stressor for gynecologic cancer survivors. While they did not provide evidence for moderation, the results for the psychological distress outcome did provide evidence for a linear relationship with social support. In general, those with better social support, as indicated by relatively higher social involvement (SNI), better support from family (PSS-Fa), better support from friends (PSS-Fr), and higher perceived availability of social resources (ISEL), reported less psychological distress than their counterparts reporting poorer social support. Regarding the traumatic stress outcome, there was no evidence for a direct relationship with social support; however, results did suggest that specific aspects of functional support, but not structural support, did moderate the relationship between health status and traumatic stress. Specifically, perceived support from friends (PSS-Fr) and perceived availability of social resources (ISEL) appeared to protect patients from traumatic stress symptoms associated poor physical health status.

Quality of Life in Gynecologic Cancer Survivorship

As hypothesized, women in this sample evidenced compromised health status compared with normative estimates (refer to Table 4). Health-related physical quality of life (SF-12 PCS) scores in this sample corresponded to norms reported for patients with minor medical illness (e.g., hypertension, respiratory illness; Ware, Kosinski, & Keller, 1996) and patients with chronic back pain (Riddle, Lee, & Stratford, 2001), though they were more favorable than norms reported for patients with chronic illness (Hurst, Ruta, & Kind, 1998). Regarding disease-specific quality of life (FACT disease-specific subscales), scores were generally comparable to those of patients within months of cancer treatment. For instance, scores for cervix patients in this sample were within 1
standard deviation of scores for patients during (Monk, Huang, Cella, & Long, 2005) and nine months following chemotherapy (Long et al., 2006) in two recent clinical trials. Comparisons for ovarian cancer patients in this sample yielded similar results, with scores in range of newly diagnosed patients prior to (Canada et al., 2006), during, and 12-months post-chemotherapy (Wenzel, Huang, Monk, Rose, & Cella, 2005). Scores for vulvar cancer patients in this sample were comparable to those in a demographically similar postoperative sample still in recovery (Janda et al., 2005).

The results for performance status and measures of particular symptoms were striking. The mean performance status (KPS) score in this sample was 79, the qualitative equivalent being “able to carry on normal activity with some effort; some signs/symptoms of disease.” Similar scores have been reported for older breast and lung cancer patients in the process of receiving radiation therapy (Lindsey, Larson, Dodd, & Brecht, 1994). In a study of a heterogeneous sample (N=293) of cancer patients, Schag, Heinrich, and Ganz (1984) demonstrated a variety of physical complaints for patients at this level of performance. Patients were assessed by a health professional and completed a questionnaire about the presence or absence of various physical complaints; 33% reported weight gain/loss, 92% reduced energy, 64% difficulty walking, 31% difficulty driving, 28% difficulty grooming themselves, and 33% maintaining employment. Regarding fatigue, mean FSI disruption index scores for this sample were comparable to those of recent bone marrow transplant patients (5 to 12 months post transplant; Sadler et al., 2002) and reflected far more disruption from fatigue than in non-cancer controls (Jacobsen et al., 1999). In addition, patients in our sample reported an average of two moderate to serious current
signs/symptoms of disease (range 0 to 5) and an average of two disruptive post-treatment vaginal changes (range 0 to 7).

In contrast, survivors did not report elevated levels of psychological distress. Their mean scores were comparable to published norms for healthy adult women on the CES-D (N=61; Carpenter et al., 1998) and the SF-12 MCS (N=1,332; Ware, Kosinski, & Keller, 1998).¹ This finding is consistent with survivor samples from Stewart et al. (2001), Miller et al. (2002), and Wenzel et al. (2002), all of whom have found mood and quality of life reports from gynecologic cancer survivors to be comparable to normative estimates using validated measures of quality of life and depressive symptoms including the EORTC QLQ-C30 (Aaronson et al., 1993), FACT-G (Cella, Tulsky, & Gray, 1994), MOS SF-36 (Ware & Sherbourne, 1992), and CES-D (Radloff, 1977).² Taken together, these results were encouraging, as they indicate that the adjustment difficulties patients experience in the acute phase following diagnosis and during treatment (see Carpenter & Andersen, 2006 for a review), appear to subside for the majority of patients as they transition to survivorship. Still, the gynecologic cancer literature (Li, Samsioe, & Iosif, 1999; Matthews et al., 1999; Wenzel et al., 2002) suggests that a significant subset of patients continue to have psychological adjustment difficulties long after diagnosis and treatment. In our sample, nearly 15% of patients met or exceeded the clinically significant cutoff score for depressive symptoms on the CES-D. By comparison, 12-month prevalence of mood disorders is approximately 9% to 10% among adults in the United States (Kessler, Chiu, Demler, & Walters, 2005).³

¹ Because the measure was created specifically for use with cancer patients, “healthy” norms are not available for the POMS-14.
² Of the seven available gynecologic cancer survivorship studies, these were the only ones reporting normative comparisons.
³ This figure includes Major Depressive Disorder, Dysthymic Disorder, and the Bipolar disorders.
Finally, these survivors did not have elevated traumatic stress levels compared to available norms. Summary statistics for the present study were comparable to IES-R and PCL-C norms available for healthy undergraduate women (N=81; Shapinsky et al., 2005) and female primary care patients (N=208; Stein, McQuaid, Pedrelli, Lenox, & McCahill, 2000). There have been no studies of traumatic stress symptoms in gynecologic cancer patients. These data are, however, consistent with studies of breast cancer (Andrykowski & Cordova, 1998; Kornblith et al., 2003) and bone marrow transplant (Smith et al., 1999) patients, which have demonstrated that, while mean levels of traumatic stress symptoms are low, specific symptoms are common and approximately 5% to 6% meet diagnostic criteria for PTSD (Andrykowski & Cordova, 1998; Cordova et al., 1995; Widows, Jacobsen, & Fields, 2000). In our sample, 8% and 9% of patients met or exceeded the clinically significant cutoff scores for traumatic stress symptoms on the PCL-C and IES-R, respectively. We can compare this figure with epidemiological data on Posttraumatic Stress Disorder, which suggest that 12-month prevalence is approximately 3% to 4% among adults in the United States (Kessler et al., 2005).

The present study also provided evidence for an association between cancer-related health status and psychological outcomes in gynecologic cancer survivors. Health status was a significant unique predictor of both psychological distress and traumatic stress, with poorer health status consistently associated with poorer psychological outcomes. These results are consistent with the cancer survivorship literature, in which health status has reliably been linked to the experience of psychological distress and traumatic stress in breast cancer patients (Bleiker et al., 2000; Kornblith et al., 2003; Lewis et al., 2001; Michael et al., 2002; Vickberg et al., 2000), head and neck cancer patients (Bjordal & Kaasa, 1995), and leukemia patients (Vickberg et al., 2001).
Again, these results are consistent with the notion that the health status difficulties associated with
gynecologic cancer survival are a source of considerable stress linked to adverse psychological
outcomes, likely due in part to the debilitating and disfiguring treatments received.

The Role of Social Support

There is little data on the relationship between social support and quality of life in
gynecologic cancer, in spite of a substantial literature describing the long-term benefits of social
support in various cancer survivor samples. Longitudinal studies of structural support have
demonstrated that the mere presence of social relationships is related to more favorable physical
(breast cancer; Waxler-Morrison et al., 1991) and psychological outcomes (breast cancer; Michael
et al., 2002). Results from cross-sectional studies of functional support suggest that higher
perceived support is associated with lower incidence of depressive and anxiety symptoms
(heterogeneous sites; Parker et al., 2003), better general psychological well-being (breast cancer;
Helgeson, Snyder, & Seltman, 2004; heterogeneous sites; Schnoll, Knowles, & Harlow, 2002), and
fewer symptoms of traumatic stress (breast cancer; Andrykowski & Cordova, 1998; Andrykowski et
al., 2000; Kornblith et al., 2003).

In the present study, the hypothesis that the deleterious effects of health status deficits on
psychological distress would be moderated by social support was not supported. Increased
structural and functional support were associated with decreased psychological distress but social
support had no protective effect for those with the poorest health status. This was inconsistent with
results from Koopman et al. (1998) who, in one of two studies of buffering in cancer survivors,
demonstrated that lower levels of aversive support and more persons in their social network
protected breast cancer patients with high life stress (stressor) from mood disturbance, but the
stressors in these two studies are vastly different (physical health status vs. incidence of stressful life events such as muggings, loss of family member or friend, etc.) and might thus require availability of different coping resources. It has been suggested (though not often shown) that structural support has a direct relationship to psychological outcomes, whereas functional support acts as a buffer (Cohen & Wills, 1985; Helgeson, 2003). Our data do not support this assertion; however, they are consistent with the general literature examining social support in cancer survivors (Helgeson, Snyder, & Seltman, 2004; Michael et al., 2002; Parker et al., 2003; Schnoll, Knowles, & Harlow, 2002) that demonstrate a linear relationship between social support and psychological outcomes. Taken together, these results suggest that, with regard to distress outcomes (i.e., depressive symptoms, mood disturbance, and psychological quality of life), gynecologic cancer survivors, like other survivor groups, sustain benefits from their social support network.

The null effects for buffering with psychological distress contrast with the findings for traumatic stress, which was moderated by social support as assessed by perceived support from friends (PSS-Fr) and perceived availability of social resources (ISEL). Of course, the occurrence of traumatic stress appeared to be largely dependent on the co-occurrence of poor health status. That is, those in good health did not report traumatic stress, whereas those in poor health did. Thus, social support – whether high or low – had no differential impact for those in good health. The critical test of buffering is with those individuals in poor health. For them, social support mattered. Those with higher levels of support reported significantly lower levels of traumatic stress than did those without support. That is, the combination of poor health and few social resources was associated with higher traumatic stress. This was consistent with results from Manne et al.
(2003) who demonstrated that perceived support from family and friends moderated the relationship between a stressor -- unsupportive partner behaviors -- and avoidance symptoms (IES) in the only study of buffering of traumatic stress symptoms in cancer survivors.

The fact that the traumatic stress results differed from the distress outcomes highlights the importance of separately examining psychological distress and traumatic stress symptoms, as the two phenomena appear to operate differently in cancer samples. For instance, Kornblith and colleagues (2003) have demonstrated that measures of distress and traumatic stress differ with regard to predictors and correlates; specifically, their results indicate that, while both were associated with general physical symptoms, distress (Brief Symptom Inventory, BSI) was uniquely predicted by age, physical functioning, social support, and severity of negative life events whereas traumatic stress symptoms (PCL-C) were predicted by years of education, lymphedema and numbness, social support, severity of negative life events, and satisfaction with medical care. In a randomized clinical trial of a supportive-expressive group therapy protocol for metastatic breast cancer patients (N=125), patients in the intervention group experienced a significant decline in traumatic stress symptoms (IES), whereas total mood disturbance (POMS) was equivalent for both groups at the 12-month follow-up. Authors speculated that the provision of support and the opportunity to discuss disease-related stress helped reduce traumatic stress symptoms (Classen et al., 2001). It is important to note that, in the present study, the traumatic stress composite included a measure of cancer-specific stress (IES), whereas the psychological distress composite included only general state measures. It might be the case that cancer-specific stress symptoms are more likely than general distress symptoms to be buffered by support from friends because friends offer an outlet for discussing issues that are too difficult for close family members.
Post hoc tests demonstrated that the ISEL appraisal and belonging subscales were moderators, but the esteem and tangible subscales were not, illustrating that availability of confidants and companionship, rather than self-esteem or availability of material aids, drove this effect. Interestingly, perceived support from family (PSS-Fa) did not moderate the relationship between health status and traumatic stress. This effect was surprising given that availability of companionship and confidants appears to be of considerable importance and that family is often the most readily available resource for patients. It is possible that family might not be ideal outlet in this case because patients might be reluctant to share burden for fear of upsetting them. Family members of cancer patients experience adverse psychological reactions, often at rates comparable to patients themselves (for a review, see Cochrane & Lewis, 2005). These reactions can be severe and long lasting (Mortimer et al., 2005). It might be the case that patients benefit from relationships outside the family unit because they provide an outlet for patients to share fears about foreshortened future or dying, for example, topics that might be too difficult for some family members. Manne, DuHamel, and Redd (2005) have demonstrated that a sense of belonging to a social network and comfort expressing cancer-related thoughts and feelings play a key role in mothers' adjustment to their children's cancer. Furthermore, their data suggest that that the responses of family and friends considered “less important” others might play a more crucial role in reducing traumatic symptoms than the “closest” family and friends. They postulated that mothers might rely on friends and extended family members because they are more insulated from the cancer stressor than members of the nuclear family. These data highlight the importance of developing a supportive network outside one’s family with whom patients can freely share their cancer experience.
Strengths & Limitations of the Current Study

The present study adds to the current gynecologic cancer survivorship literature not only by providing needed data on quality of life in this population, but also by testing a theoretical model that delineates the relationship between health status, social support, and psychological outcomes. This research represents an important first step in describing the survivorship experience in this population. The cross-sectional design allowed for efficient recruitment of a large cohort that was representative of gynecologic cancer survivors (Jemal et al., 2006). More importantly, the hypotheses tested support prior findings and advance theory. Prior research with cancer patients supports the examination of social support as a predictor of psychological outcomes (Andrykowski et al., 2000; Kornblith et al., 2003; Michael et al., 2002; Parker et al., 2003; Schnoll, Knowles, & Harlow, 2002; Waxler-Morrison et al., 1991) and as a moderator (Koopman et al., 1998; Manne et al., 2003). In addition, the stress-buffering model (Cohen & Willis, 1985) provides a solid theoretical basis for this research. Health status is conceptualized as a significant stressor and is appropriately assessed as a multi-dimensional construct. We examine two separate, but equally relevant psychological outcomes, psychological distress and traumatic stress symptoms. In addition, the use of multiple social support measures represents a significant strength, as it is undoubtedly multi-dimensional.

The cross-sectional design used here does not allow for causal inference and directionality cannot be established from these data. The data are discussed and analyzed with physical symptoms as the stressors and psychological distress and traumatic stress as the outcomes, however it might also be the case that psychological distress results in increased experiencing or reporting of physical symptoms. Several authors have demonstrated that negative affect
significantly alters responses to somatic symptoms. For instance, a number of experimental studies show that laboratory-induced depressed and anxious mood states can significantly alter subjects’ responses to cold pressor or other induced pain (e.g., Carter et al., 2002; Weisenberg, Raz, & Tener, 1998; Willoughby, Hailey, Mulkana, & Rowe, 2002). This effect has repeatedly been attributed to transient negative mood states (e.g., Salovey & Birnbaum, 1989) and to dispositional/chronic negative affect (e.g., Watten, Vassend, Myhrer, & Syversen, 1997; Feldman, Cohen, Doyle, Skoner, & Gwaltney, 1999; Stegen, Van Diest, Van de Woestijne, & Van den Bergh, 2001). Gendolla and colleagues (2005) have proposed yet another explanation; they posit a joint impact hypothesis, specifying that both negative affect and self-focus are required to magnify the experience or reporting of somatic symptoms, i.e., negative affect only enhances the experience of physical symptoms when attention is self-focused and vice versa. A prospective, longitudinal design is needed to establish the direction of the relationships tested here. Such data would also be useful for observing the dynamics of this relationship over time -- through important milestones of diagnosis, treatment, and survivorship.

There are several issues regarding generalizability of the findings. Obviously, those who died (from any cause) were not included, which limits our ability to generalize results to women with aggressive, rapidly progressing cancers or significant medical morbidity. In addition, only those participants who presented for follow-up with their physician were accrued. Thus, women with fewer economic (Rahman, Dignan, & Shelton, 2003) or social resources (Katapodi, Facione, Miaskowski, Dodd, & Waters, 2002) might not have been adequately represented. In addition, ethnic minority participation was regrettably negligible (5%). The available research on African-American cancer patients suggests that they might have higher rates of distress, more comorbid
medical conditions, and more unmet medical and emotional needs than cancer patients with other ethnic backgrounds (e.g., Ashing-Giwa, Ganz, & Peterson, 1999; Ogle, Swanson, Woods, & Azzouz, 2000). This research would have been enhanced substantially had the sample included more minority participants.

**Implications and Future Directions**

In summary, despite a substantial cancer survivorship literature, much is yet to be learned about the basic domains of quality of life, i.e., emotional or social adjustment, occupational outcomes, or the aspects of physical health that might influence quality of life for gynecologic cancer survivors. The current study begins to elucidate that picture and the relationships therein. Additional studies, including prospective studies extending into survivorship, that test predictors of adjustment are needed to enhance our understanding of the gynecologic cancer experience, as nearly 80,000 women in the United States will be diagnosed in 2006 (Jemal et al., 2006). In particular, the latter is an important step toward designing interventions tailored to the difficulties and circumstances of differing groups.

Another important line of research will likely involve physiological stress outcomes. As mentioned previously, there is a rich literature examining social support as a buffer for biological stress responses, e.g., cardiac (Cohen et al., 1997) and endocrine responses (Uchino, Caccioppo, & Kiecolt-Glaser, 1996). There is a developing interest in the relationship between psychosocial variables, including social support, and important cancer-related immune markers. For instance, Marucha, Crespin, Shelby, and Andersen (2005) have examined the association between tumor necrosis factor-α (TNF-α), an important cytokine associated with tumor regression, and social/family involvement. Results indicated that patients reporting increased social activities or
higher relationship satisfaction exhibited stronger TNF-α responses. Such studies provide important insight into behavioral variables that might improve patients’ disease outcomes and, again serve as important targets for quality of life-enhancing interventions. For instance, results from the present study would suggest that focus on management of physical sequelae of cancer treatment and enhancing support from friends might be appropriate and important in developing a psychosocial intervention protocol.

In summary, the present study suggests that health status deficits are a persistent stressor for gynecologic cancer survivors, one that is associated with increased symptoms of psychological distress and traumatic stress. Furthermore, better social support, as indicated by relatively higher social involvement, better support from family and friends, and higher perceived availability of social resources, is associated with less psychological distress (i.e., depressive symptoms, anxiety symptoms, psychological quality of life). In addition, this research provides evidence for stress buffering, in that perceived support from friends and perceived availability of social resources appeared to protect patients from the traumatic stress symptoms associated poor physical health status, whereas the combination of poor health and few social resources was associated with high traumatic stress.
LIST OF REFERENCES


APPENDIX A

TABLES
<table>
<thead>
<tr>
<th>Authors</th>
<th>Disease Sites</th>
<th>N</th>
<th>Time Since Diagnosis</th>
<th>Design &amp; Measures</th>
<th>Key Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li, Samsioe, &amp; Iosif (1999)</td>
<td>Endometrial</td>
<td>58</td>
<td>5-7 yrs post dx</td>
<td>Mailed survey</td>
<td>Younger pts reported greater depressive symptoms than older pts or controls and reported feeling more &quot;overstressed&quot; than older pts.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Author-derived QoL measure</td>
<td>Younger pts reported significantly more stomach discomfort, nausea, and diarrhea and lower energy than controls.</td>
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<td></td>
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<td></td>
<td>Younger and older cancer pts equivalent on physical sx.</td>
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<td>Matthews et al. (1999)</td>
<td>Vagina, Cervix</td>
<td>220</td>
<td>18 yrs (mean)</td>
<td>Mailed survey</td>
<td>17% of pts mildly depressed; 9% were moderately or severely depressed.</td>
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<td></td>
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<td></td>
<td></td>
<td>BDI – depressive sx</td>
<td>Low perceived social support was associated with increased depressive sx.</td>
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<td></td>
<td>Author derived QoL measure</td>
<td>46% reported feeling less healthy than other women their age, 22%</td>
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<td>reported disease interfered at least moderately with ability to fulfill life roles.</td>
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<td>21% reporting &quot;it is impossible for me to reach my goals.&quot;</td>
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<td>12% reported current pelvic pain, 28% current urinary incontinence, 17%</td>
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<td></td>
<td>difficulty initiating urination, 13% recurrent bladder or urinary tract infections, 20% chronic diarrhea, and 15% chronic constipation.</td>
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<tr>
<td>Carlsson, Strang, &amp; Bjurnstrom (2000)</td>
<td>Heterogenous</td>
<td>235</td>
<td>Various</td>
<td>Interview</td>
<td>Role functioning, emotional functioning, cognitive functioning, and overall quality of life were same for those treated in the last 12 months and those treated &gt;5 yrs prior.</td>
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<td></td>
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<td></td>
<td></td>
<td>EORTC QLQ-C30</td>
<td>Pts treated with chemotherapy had poorer role and cognitive functioning and more problems with fatigue, nausea and vomiting, dyspnea, and constipation. Pts treated with radiotherapy had significantly more problems with flatulence and diarrhea. Adjuvant therapy associated with increased long-term physical side effects.</td>
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<td></td>
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<td></td>
<td>Pts treated &gt;5 years prior to assessment reporting significantly more problems than those treated 1-3 years or 3-5 years prior.</td>
</tr>
</tbody>
</table>

Table 1. Summary of studies of gynecologic cancer survivors

Continued
<table>
<thead>
<tr>
<th>Study</th>
<th>Cancer Type</th>
<th>Sample Size</th>
<th>Follow-up</th>
<th>Study Method</th>
<th>Measures</th>
<th>Findings</th>
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</thead>
<tbody>
<tr>
<td>Stewart et al. (2001)</td>
<td>Ovarian</td>
<td>295</td>
<td>&gt;2 yrs; 7 yrs (mean)</td>
<td>Mailed survey</td>
<td>EORTC QLQ-C30</td>
<td>Mental health and energy level were comparable to available norms. Most pts reported that cancer experience had positively impacted their life. 45% of chemotherapy pts reported difficulty thinking and 52% memory difficulties. 53% of all pts reported current pelvic pain or discomfort. 53% of pts reporting pain described it as moderate to severe.</td>
</tr>
<tr>
<td>Wenzel et al. (2002)</td>
<td>Ovarian, stage I-III</td>
<td>49</td>
<td>5-10 yrs; 9 yrs (mean)</td>
<td>Telephone survey</td>
<td>FACT-G – QoL, MOS SF-36 – QoL, CES-D – depressive sx</td>
<td>Scores on measures of physical, emotional, and social well-being were comparable to available norms for other cancer survivors and non-cancer controls, though 20% and 23% of pts were below norms for emotional and social functioning. Emotional well-being was significantly associated with self-reports of general health and vitality and with depressive symptoms. Pts reported significant distress related to fear of recurrence (22%), fear of a second cancer (36%), and future diagnostic screening (30%). 20% of pts rated long-term sequelae of treatment as primary concern. 20% reported continued treatment side effects, including abdominal pain (18%) and neurotoxicity (39%).</td>
</tr>
<tr>
<td>Miller et al. (2002)</td>
<td>Heterogeneous</td>
<td>85</td>
<td>&gt;6 mos; 3 yrs (mean)</td>
<td>Interview</td>
<td>FACT-G – QoL</td>
<td>QoL scores comparable in the cancer and healthy comparison groups. Emotional well-being scores were significantly lower for ovarian pts than for cervical or endometrial cancer pts. Overall quality of life scores were higher for non-ovarian diagnosis and no adjuvant treatment. Functional subscale scores were lower in pts with ovarian cancer, women with fewer years of education, and women with no help at home.</td>
</tr>
<tr>
<td>Frumovitz et al. (2005)</td>
<td>Cervix, stage I</td>
<td>74</td>
<td>&gt;5 yrs; 7-8 yrs (mean)</td>
<td>Mailed survey</td>
<td>SF-12 – QoL, BSI-18 – psych sx, Menopausal survey – sx</td>
<td>Pts receiving radiation had relatively poorer physical QoL, greater incidence of menopausal symptoms, somatization symptoms, depressive and anxious symptoms.</td>
</tr>
<tr>
<td>Variable</td>
<td>All Cancers (N=260)</td>
<td>Cervical (n=47)</td>
<td>Endometrial (n=133)</td>
<td>Ovarian (n=69)</td>
<td>Vulvar (n=11)</td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------------</td>
<td>-----------------</td>
<td>---------------------</td>
<td>----------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>56.4 (12.3)</td>
<td>47.9 (12.2)</td>
<td>59.8 (10.9)</td>
<td>55.2 (11.6)</td>
<td>60.3 (14.9)</td>
<td></td>
</tr>
<tr>
<td>Race (%):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>95%</td>
<td>98%</td>
<td>94%</td>
<td>96%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>3%</td>
<td>2%</td>
<td>4%</td>
<td>1%</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Asian-American</td>
<td>2%</td>
<td>--</td>
<td>2%</td>
<td>3%</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>1%</td>
<td>--</td>
<td>1%</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Married (% yes)</td>
<td>63%</td>
<td>70%</td>
<td>57%</td>
<td>68%</td>
<td>64%</td>
<td></td>
</tr>
<tr>
<td>Years with partner</td>
<td>26.1 (15.9)</td>
<td>17.0 (12.0)</td>
<td>31.1 (15.3)</td>
<td>24.7 (16.5)</td>
<td>25.3 (15.4)</td>
<td></td>
</tr>
<tr>
<td>Living with partner (% yes)</td>
<td>68%</td>
<td>81%</td>
<td>62%</td>
<td>69%</td>
<td>72%</td>
<td></td>
</tr>
<tr>
<td>Years of education</td>
<td>14.1 (2.8)</td>
<td>13.5 (2.4)</td>
<td>14.3 (2.8)</td>
<td>14.3 (3.0)</td>
<td>13.3 (1.7)</td>
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</tr>
<tr>
<td>Employed (% yes)</td>
<td>47%</td>
<td>43%</td>
<td>44%</td>
<td>47%</td>
<td>36%</td>
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<tr>
<td>Hours worked per week</td>
<td>36.5 (13.5)</td>
<td>37.9 (12.5)</td>
<td>36.8 (12.4)</td>
<td>36.3 (15.9)</td>
<td>25.3 (14.2)</td>
<td></td>
</tr>
<tr>
<td>Median Family income, $000s</td>
<td>45.0 (320.5)¹</td>
<td>55.0 (738.3)</td>
<td>42.0 (63.5)</td>
<td>48.0 (48.6)</td>
<td>32.0 (47.6)</td>
<td></td>
</tr>
<tr>
<td>Mean Personal income, $000s</td>
<td>25.8 (37.3)</td>
<td>28.6 (47.3)</td>
<td>28.6 (47.3)</td>
<td>21.9 (19.4)</td>
<td>16.4 (12.7)</td>
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<tr>
<td>Use of HRT (% yes)</td>
<td>50%</td>
<td>49%</td>
<td>45%</td>
<td>57%</td>
<td>64%</td>
<td></td>
</tr>
<tr>
<td>Stage (%):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>60%</td>
<td>72%</td>
<td>71%</td>
<td>36%</td>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>9%</td>
<td>9%</td>
<td>5%</td>
<td>9%</td>
<td>73%</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>24%</td>
<td>15%</td>
<td>17%</td>
<td>46%</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>4%</td>
<td>2%</td>
<td>4%</td>
<td>4%</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Not staged</td>
<td>3%</td>
<td>2%</td>
<td>3%</td>
<td>5%</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Sociodemographic and disease variables by disease site

¹ Data are skewed by one patient in the cervical group whose annual household income is five million dollars.
Table 2: continued

<table>
<thead>
<tr>
<th>Grade (%)</th>
<th>I</th>
<th>40%</th>
<th>13%</th>
<th>56%</th>
<th>28%</th>
<th>27%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>II</td>
<td>26%</td>
<td>40%</td>
<td>26%</td>
<td>16%</td>
<td>27%</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>25%</td>
<td>38%</td>
<td>14%</td>
<td>38%</td>
<td>27%</td>
</tr>
<tr>
<td></td>
<td>Not graded</td>
<td>9%</td>
<td>9%</td>
<td>4%</td>
<td>18%</td>
<td>19%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Months Since Diagnosis</th>
<th>51.3 (25.0)</th>
<th>57.5 (30.9)</th>
<th>50.1 (25.1)</th>
<th>48.7 (19.6)</th>
<th>54.8 (24.7)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Treatment (%)</th>
<th>Hysterectomy</th>
<th>79%</th>
<th>70%</th>
<th>92%</th>
<th>72%</th>
<th>0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemotherapy</td>
<td>44%</td>
<td>47%</td>
<td>31%</td>
<td>74%</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Radiation</td>
<td>22%</td>
<td>53%</td>
<td>19%</td>
<td>4%</td>
<td>27%</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Unless otherwise indicated, values are means (standard deviations). Subscripts indicate significant between-group differences (p<0.05), c=cervical, e=endometrial, o=ovarian, v=vulvar/vaginal.
<table>
<thead>
<tr>
<th>1</th>
<th>Vaginal Changes</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Performance status (KPS)</td>
<td>-0.116</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Disease QoL (FACT)</td>
<td>-0.291**</td>
<td>0.460**</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fatigue (FSI TDI)</td>
<td>0.214**</td>
<td>-0.617**</td>
<td>-0.516**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Signs/symptoms (SWOG)</td>
<td>0.359**</td>
<td>-0.309**</td>
<td>-0.350**</td>
<td>0.336**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Physical QoL (SF-12 PCS)</td>
<td>-0.085</td>
<td>0.687**</td>
<td>0.411**</td>
<td>-0.517**</td>
<td>-0.244**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Social Involvement (SNI)</td>
<td>0.065</td>
<td>0.102</td>
<td>0.189**</td>
<td>-0.190**</td>
<td>-0.113</td>
<td>0.085</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Support – friends (PSS-Fa)</td>
<td>-0.084</td>
<td>0.169**</td>
<td>0.193**</td>
<td>-0.210**</td>
<td>-0.087</td>
<td>0.150*</td>
<td>0.246**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Support – family (PSS-Fr)</td>
<td>-0.030</td>
<td>0.069</td>
<td>0.140*</td>
<td>-0.098</td>
<td>-0.055</td>
<td>0.074</td>
<td>0.238**</td>
<td>0.430**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Perceived social resources (ISEL)</td>
<td>-0.059</td>
<td>0.247**</td>
<td>0.340**</td>
<td>-0.287**</td>
<td>-0.112</td>
<td>0.257**</td>
<td>0.301**</td>
<td>0.583**</td>
<td>0.693**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Mental QoL (SF-12 MCS)</td>
<td>-0.215**</td>
<td>0.147*</td>
<td>0.341**</td>
<td>-0.445**</td>
<td>-0.165**</td>
<td>-0.141*</td>
<td>0.267**</td>
<td>0.248**</td>
<td>0.233**</td>
<td>0.275**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Depressive symptoms (CES-D)</td>
<td>0.174**</td>
<td>-0.396**</td>
<td>-0.510**</td>
<td>0.632**</td>
<td>0.236**</td>
<td>-0.333**</td>
<td>-0.248**</td>
<td>-0.297**</td>
<td>-0.180**</td>
<td>-0.389**</td>
<td>-0.620**</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Mood (POMS TMD)</td>
<td>0.114</td>
<td>-0.253**</td>
<td>-0.390**</td>
<td>0.437**</td>
<td>0.120</td>
<td>-0.153*</td>
<td>-0.216**</td>
<td>-0.280**</td>
<td>-0.202**</td>
<td>-0.318**</td>
<td>-0.583**</td>
<td>0.661**</td>
</tr>
<tr>
<td>14</td>
<td>Traumatic stress, cancer (IES-R)</td>
<td>0.232**</td>
<td>-0.132*</td>
<td>-0.305**</td>
<td>0.273**</td>
<td>0.190**</td>
<td>-0.069</td>
<td>-0.159*</td>
<td>-0.066</td>
<td>-0.032</td>
<td>-0.116</td>
<td>-0.380**</td>
<td>0.386**</td>
</tr>
<tr>
<td>15</td>
<td>Traumatic stress, general (PCL-C)</td>
<td>0.236**</td>
<td>-0.198**</td>
<td>-0.388**</td>
<td>0.453**</td>
<td>0.189**</td>
<td>-0.157*</td>
<td>-0.103</td>
<td>-0.232**</td>
<td>-0.133*</td>
<td>-0.226**</td>
<td>-0.494**</td>
<td>0.545**</td>
</tr>
</tbody>
</table>

Note: *Correlation is significant p<0.05 (2-tailed).  **Correlation is significant p<0.01 (2-tailed).

Table 3. Correlations among health status and outcome variables
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (Std Dev)</th>
<th>Range</th>
<th>Norm Data, Mean (Std Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health-related physical QoL (SF-12 PCS)</td>
<td>44.267 (12.917)</td>
<td>0 to 100</td>
<td>49.1 (n/a)1, 46.7 (8.6)2</td>
</tr>
<tr>
<td>Disease-specific QoL:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cervical (FACT-Cx)</td>
<td>46.915 (6.704)</td>
<td>0 to 60</td>
<td>40.1 (8.2)3, 43.2 (9.2)4</td>
</tr>
<tr>
<td>Endometrial (FACT-En)</td>
<td>57.243 (6.371)</td>
<td>0 to 64</td>
<td>N/A</td>
</tr>
<tr>
<td>Ovarian (FACT-O)</td>
<td>34.942 (5.067)</td>
<td>0 to 48</td>
<td>33.3 (6.37)5, 38.3 (6.0)6</td>
</tr>
<tr>
<td>Vulvar (FACT-V)</td>
<td>44.221 (8.914)</td>
<td>0 to 60</td>
<td>43.8 (n/a)7</td>
</tr>
<tr>
<td>Fatigue (FSI TDI)</td>
<td>15.373 (15.825)</td>
<td>0 to 70</td>
<td>15.2(n/a)8, 9.9 (n/a)9</td>
</tr>
<tr>
<td>Signs/symptoms &amp; toxicities (SWOG)</td>
<td>2.137 (0.750)</td>
<td>0 to 16</td>
<td>N/A</td>
</tr>
<tr>
<td>Vaginal changes</td>
<td>1.803 (1.637)</td>
<td>0 to 5</td>
<td>N/A</td>
</tr>
<tr>
<td>Performance status (KPS)</td>
<td>78.460 (11.216)</td>
<td>0 to 100</td>
<td>78.6 (18.0)10</td>
</tr>
<tr>
<td><strong>Psychological Distress</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mood (POMS-14 TMD)</td>
<td>10.679 (7.014)</td>
<td>0 to 28</td>
<td>N/A</td>
</tr>
<tr>
<td>Depressive symptoms (CES-D)</td>
<td>4.302 (3.858)</td>
<td>0 to 22</td>
<td>6.6 (4.0)11</td>
</tr>
<tr>
<td>Health-related psychological QoL (SF-12 MCS)</td>
<td>52.713 (10.151)</td>
<td>0 to 100</td>
<td>49.4 (N/A)1</td>
</tr>
<tr>
<td><strong>Traumatic Stress</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer-related traumatic stress (IES-R)</td>
<td>11.576 (13.567)</td>
<td>0 to 88</td>
<td>14.3 (14.7)12</td>
</tr>
<tr>
<td>Traumatic stress (PCL-C)</td>
<td>26.208 (11.971)</td>
<td>17 to 85</td>
<td>304.4 (11.8)8, 30.8 (12.6)13</td>
</tr>
</tbody>
</table>

Table 4. Predictor and outcome variable, all patients (N=260)

---

1 Ware, Kosinski, & Keller (1996). N=1332, mean score for US females.
4 Long et al. (2006). Patients 9 months following chemotherapy.
5 Canada et al. (2006). N=129, newly diagnosed ovarian cancer patients.
6 Wenzel et al. (2005). N=144, advanced ovarian cancer patients 12 months following chemotherapy.
8 Sadler et al. (2002). N=51, BMT patients.
9 Jacobsen et al. (1999). N=54 noncancer controls.
10 Lindsey et al. (1994). N=45 older lung and breast cancer patients receiving chemotherapy.
13 Stein et al. (2001). N=208 primary care patients, women (mean age = 36.9).
Table 3: continued

<table>
<thead>
<tr>
<th>Social Support</th>
<th>Mean (SD)</th>
<th>Range</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural support (SNI)</td>
<td>6.235 (3.396)</td>
<td>1 to 12</td>
<td>N/A</td>
</tr>
<tr>
<td>Perceived support from family (PSS-Fa)</td>
<td>17.705 (4.096)</td>
<td>0 to 20</td>
<td>N/A</td>
</tr>
<tr>
<td>Perceived support from friends (PSS-Fr)</td>
<td>17.709 (4.021)</td>
<td>0 to 20</td>
<td>N/A</td>
</tr>
<tr>
<td>Perceived availability of social resources (ISEL)</td>
<td>75.356 (5.068)</td>
<td>40 to 80</td>
<td>N/A</td>
</tr>
</tbody>
</table>
**Psychological Distress**

<table>
<thead>
<tr>
<th>Step and Predictors</th>
<th>Total $R^2$</th>
<th>$\Delta R^2$</th>
<th>Unstand $\beta$</th>
<th>$t$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Age</td>
<td>0.115</td>
<td>0.115</td>
<td>-0.021</td>
<td>-4.777</td>
<td>0.000***</td>
</tr>
<tr>
<td>2  Months since diagnosis</td>
<td>0.128</td>
<td>0.013</td>
<td>-0.003</td>
<td>-1.189</td>
<td>0.236</td>
</tr>
<tr>
<td>3  Health status</td>
<td>0.330</td>
<td>0.202</td>
<td>0.527</td>
<td>6.671</td>
<td>0.000***</td>
</tr>
<tr>
<td>4  Social involvement (SNI)</td>
<td>0.358</td>
<td>0.027</td>
<td>-0.157</td>
<td>-2.880</td>
<td>0.004**</td>
</tr>
<tr>
<td>5  Health status X SNI</td>
<td>0.368</td>
<td>0.010</td>
<td>-0.093</td>
<td>-1.717</td>
<td>0.088</td>
</tr>
</tbody>
</table>

Note: *$p<0.05$, **$p<0.01$, ***$p<0.001$*

Table 5. Results of HMLR analyses testing buffering effect of social involvement
Table 6. Results of HMLR analyses testing the buffering effect of perceived support from family

Table 7. Results of HMLR analyses testing buffering effect of perceived support from friends
### Psychological Distress

#### Final Model Statistics

\[ F(5,254)=30.343, \ p<0.001 \]

<table>
<thead>
<tr>
<th>Step and Predictors</th>
<th>Total R²</th>
<th>Δ R²</th>
<th>Unstand β</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Age</td>
<td>0.103</td>
<td>0.103</td>
<td>-0.022</td>
<td>-6.146</td>
<td>0.000***</td>
</tr>
<tr>
<td>2  Months since diagnosis</td>
<td>0.118</td>
<td>0.015</td>
<td>-0.003</td>
<td>-1.545</td>
<td>0.124</td>
</tr>
<tr>
<td>3  Health status</td>
<td>0.312</td>
<td>0.194</td>
<td>0.456</td>
<td>6.824</td>
<td>0.000***</td>
</tr>
<tr>
<td>4  Perceived resources (ISEL)</td>
<td>0.374</td>
<td>0.062</td>
<td>-0.235</td>
<td>-4.691</td>
<td>0.000***</td>
</tr>
<tr>
<td>5  Health status X ISEL</td>
<td>0.374</td>
<td>0.000</td>
<td>0.016</td>
<td>0.390</td>
<td>0.696</td>
</tr>
</tbody>
</table>

Note: *p<0.05, **p<0.01, ***p<0.001

Table 8. Results of HMLR analyses testing buffering effect of perceived availability of social resources
### Final Model Statistics

\[ F(5, 181) = 10.851, \ p < 0.001 \]

<table>
<thead>
<tr>
<th>Step and Predictors</th>
<th>Total R²</th>
<th>Δ R²</th>
<th>Unstandardised β</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Age</td>
<td>0.063</td>
<td>0.063</td>
<td>-0.015</td>
<td>-2.896</td>
<td>0.004**</td>
</tr>
<tr>
<td>2 Hysterectomy</td>
<td>0.094</td>
<td>0.032</td>
<td>-0.321</td>
<td>-2.116</td>
<td>0.036*</td>
</tr>
<tr>
<td>3 Health status</td>
<td>0.216</td>
<td>0.122</td>
<td>0.427</td>
<td>4.823</td>
<td>0.000***</td>
</tr>
<tr>
<td>4 Social involvement (SNI)</td>
<td>0.221</td>
<td>0.005</td>
<td>-0.072</td>
<td>-1.155</td>
<td>0.250</td>
</tr>
<tr>
<td>5 Health status X SNI</td>
<td>0.231</td>
<td>0.010</td>
<td>-0.092</td>
<td>-1.508</td>
<td>0.133</td>
</tr>
</tbody>
</table>

Note: *p<0.05, **p<0.01, ***p<0.001

Table 9. Results of HMLR analyses testing buffering effect of social involvement
### Table 10. Results of HMLR analyses testing the buffering effect of perceived support from family

<table>
<thead>
<tr>
<th>Step and Predictors</th>
<th>Total R²</th>
<th>Δ R²</th>
<th>Unstand β</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Age</td>
<td>0.053</td>
<td>0.053</td>
<td>-0.015</td>
<td>-3.843</td>
<td>0.000***</td>
</tr>
<tr>
<td>2 Hysterectomy</td>
<td>0.069</td>
<td>0.015</td>
<td>-0.140</td>
<td>-1.155</td>
<td>0.249</td>
</tr>
<tr>
<td>3 Health status</td>
<td>0.207</td>
<td>0.139</td>
<td>0.460</td>
<td>6.310</td>
<td>0.000***</td>
</tr>
<tr>
<td>4 Perceived support (PSS-Fa)</td>
<td>0.213</td>
<td>0.005</td>
<td>-0.043</td>
<td>-0.819</td>
<td>0.414</td>
</tr>
<tr>
<td>5 Health status X PSS-Fa</td>
<td>0.218</td>
<td>0.005</td>
<td>-0.063</td>
<td>-1.304</td>
<td>0.193</td>
</tr>
</tbody>
</table>

Note: *p<0.05, **p<0.01, ***p<0.001

### Table 11. Results of HMLR analyses testing buffering effect of perceived support from friends

<table>
<thead>
<tr>
<th>Step and Predictors</th>
<th>Total R²</th>
<th>Δ R²</th>
<th>Unstand β</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Age</td>
<td>0.056</td>
<td>0.056</td>
<td>-0.015</td>
<td>-3.937</td>
<td>0.000***</td>
</tr>
<tr>
<td>2 Hysterectomy</td>
<td>0.073</td>
<td>0.017</td>
<td>-0.182</td>
<td>-1.516</td>
<td>0.131</td>
</tr>
<tr>
<td>3 Health status</td>
<td>0.220</td>
<td>0.147</td>
<td>0.488</td>
<td>6.835</td>
<td>0.000***</td>
</tr>
<tr>
<td>4 Perceived support (PSS-Fr)</td>
<td>0.224</td>
<td>0.004</td>
<td>-0.015</td>
<td>-0.301</td>
<td>0.764</td>
</tr>
<tr>
<td>5 Health status X PSS-Fr</td>
<td>0.246</td>
<td>0.022</td>
<td>-0.132</td>
<td>-2.722</td>
<td>0.007**</td>
</tr>
</tbody>
</table>

Note: *p<0.05, **p<0.01, ***p<0.001
### Traumatic Stress

**Final Model Statistics**

\[ F(5,254) = 14.916, p < 0.001 \]

<table>
<thead>
<tr>
<th>Step and Predictors</th>
<th>Total R²</th>
<th>Δ R²</th>
<th>Unstand β</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Age</td>
<td>0.053</td>
<td>0.053</td>
<td>-0.015</td>
<td>-3.761</td>
<td>0.000***</td>
</tr>
<tr>
<td>2 Hysterectomy</td>
<td>0.069</td>
<td>0.015</td>
<td>-0.161</td>
<td>-1.340</td>
<td>0.181</td>
</tr>
<tr>
<td>3 Health status</td>
<td>0.207</td>
<td>0.139</td>
<td>0.440</td>
<td>5.891</td>
<td>0.000***</td>
</tr>
<tr>
<td>4 Perceived resources (ISEL)</td>
<td>0.213</td>
<td>0.005</td>
<td>-0.016</td>
<td>-0.289</td>
<td>0.773</td>
</tr>
<tr>
<td>5 Health status X ISEL-Total</td>
<td>0.227</td>
<td>0.014</td>
<td>-0.101</td>
<td>-2.160</td>
<td>0.032*</td>
</tr>
</tbody>
</table>

Note: *p<0.05, **p<0.01, ***p<0.001

Table 12. Results of HMLR analyses testing buffering effect of perceived availability of social resources.
<table>
<thead>
<tr>
<th>Step and Predictors</th>
<th>ISEL-Appraisal</th>
<th>ISEL-Belonging</th>
<th>ISEL-Esteem</th>
<th>ISEL-Tangible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Δ $R^2$</td>
<td>Unstand β</td>
<td>p-value</td>
<td>Δ $R^2$</td>
</tr>
<tr>
<td><strong>Traumatic Stress</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Age</td>
<td>0.053</td>
<td>-0.015</td>
<td>0.000***</td>
<td>0.053</td>
</tr>
<tr>
<td>2 Hysterectomy</td>
<td>0.015</td>
<td>-0.156</td>
<td>0.198</td>
<td>0.015</td>
</tr>
<tr>
<td>3 Health status</td>
<td>0.139</td>
<td>0.467</td>
<td>0.000***</td>
<td>0.139</td>
</tr>
<tr>
<td>4 ISEL subscale</td>
<td>0.002</td>
<td>-0.004</td>
<td>0.941</td>
<td>0.011</td>
</tr>
<tr>
<td>5 Health status X ISEL</td>
<td>0.013</td>
<td>-0.097</td>
<td>0.042*</td>
<td>0.029</td>
</tr>
</tbody>
</table>

$F(5,254)=14.522, p<0.001$  
$F(5,254)=16.697, p<0.001$  
$F(5,254)=13.704, p<0.001$  
$F(5,254)=13.811, g<0.001$

Total $R^2=0.207$  
Total $R^2=0.247$  
Total $R^2=0.212$  
Total $R^2=0.214$

Notes: Unstandardized $β$ and $p$-values represent final model statistics. *$p<0.05$, **$p<0.01$, ***$p<0.001$.

Table 13. Results of HMLR analyses testing buffering effect of ISEL subscales
APPENDIX B

FIGURES
Figure 1. Illustration of the Stress-Buffering Model (Cohen & Wills, 1985)
Figure 2. Model Stress Buffering the Psychological Distress Associated with Health Status

Social Support
Functional (PSS-Fr/Fa, ISEL)
Structural (SNI)

Health Status

Composite of:
- Physical quality of life (SF-12)
- Disease-specific quality of life (FACT)
- Fatigue (FSI)
- Performance status (KPS)
- Signs/symptoms & toxicities (SWOG)
- Vaginal changes

Psychological Distress

Composite of:
- Mood (POMS-14)
- Depressive symptoms (CES-D)
- Mental quality of life (SF-12)
Figure 3. Model for Stress Buffering the Traumatic Stresss Associated with Health Status

Social Support
Functional (PSS-Fr/Fa, ISEL)
Structural (SNI)

Health Status

Composite of:
- Physical quality of life (SF-12)
- Disease-specific quality of life (FACT)
- Fatigue (FSI)
- Performance status (KPS)
- Signs/symptoms & toxicities (SWOG)
- Vaginal changes

Traumatic Stress

Composite of:
- Cancer-specific traumatic stress (IES)
- Traumatic stress symptoms (PCL-C)
Notes: Excluded/Ineligible category includes those deemed ineligible due to age, time since diagnosis, or current treatment status. Individuals returning to the clinic for multiple visits were counted only once.

Figure 4. Accrual Diagram For Study, 1/3/2005 to 12/20/2005
Figure 5. Simple Slopes: Predicting Traumatic Stress Using Low vs. High PSS-Fr
Figure 6. Simple Slopes: Predicting Traumatic Stress Using Low vs. High ISEL-Total
Figure 7. Simple Slopes: Predicting Traumatic Stress Using Low vs. High ISEL-Appraisal
Figure 8. Simple Slopes: Predicting Traumatic Stress Using Low vs. High ISEL-Belonging