DO ACTIVE DUTY CANCER SURVIVORS WITH A CONCURRENT BEHAVIORAL HEALTH DIAGNOSIS HAVE DISTINCT SURVIVORSHIP CARE NEEDS?

by

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DISCLAIMER

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ABSTRACT

Do Active Duty Cancer Survivors with a Concurrent Behavioral Health Diagnosis Have Distinct Survivorship Needs?

Courtney Collins Fox, M.S., 2014

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It is estimated that 30 to 50 percent of cancer survivors will have a diagnosable behavioral health condition at some point (23; 67; 69; 84; 92). Military personnel are also at risk for behavioral health problems. Behavioral health-related conditions accounted for more in- and outpatient hospital visits for Active Duty personnel than any other condition (aside from routine visits) in 2011 (11; 12). Despite these observations it is currently unclear whether those on Active Duty who receive a cancer diagnosis and treatment for cancer are more likely to have higher rates of behavioral health diagnoses than a military–affiliated civilian cancer survivor comparison group who are eligible for treatment within the Military Health System.

One hundred ninety four active duty cancer survivors and 194 military-affiliated civilian cancer survivors (used as a comparison group) were matched on cancer type, marital status, age, and gender. Data were extracted databases held by TRICARE Management Activity. Case definition for cancer survivor was an individual diagnosed with and treated for cancer a diagnosis in fiscal year 2006 or 2007 and completed with primary anti-cancer treatment by the end of fiscal year 2010. Chi square analyses, logistic regression, Cox regression, and negative binomial regressions were used.

Results indicated that Active Duty cancer survivors had higher incidence of Mood ($\chi^2(1, N = 347) = 5.87, p < 0.05$), Anxiety/Adjustment ($\chi^2(1, N = 347) = 10.65, p < 0.01$), and Other Disorders ($\chi^2(1, N = 347) = 5.90, p < 0.05$), than non-Active Duty cancer survivors. Additionally, Active Duty cancer survivors with a behavioral health diagnosis had the most healthcare encounters (Exp(B)= 1.35, 95% CI = 0.56-0.98, $p < .05$), and were more likely to receive behavioral health treatment within the MHS (Exp(B)= 1.77, 95% CI = 1.09-2.86, $p < .05$). Both active duty and military-affiliated civilian cancer survivors with a behavioral health diagnosis had more medical encounters (Exp(B)= 1.37, 95% CI = 1.11-1.70, $p < .05$), more psychotropic prescriptions (Exp(B)= 2.92, 95% CI = 1.79-4.77, $p < .05$), and were more likely to receive behavioral health treatment than those without a behavioral health diagnosis (Exp(B)= 7.45, 95% CI = 2.86-19.39, $p < .05$). Risk for receiving a behavioral health diagnosis increased with time following the cancer diagnosis for both groups (Exp(B)= 1.05, 95% CI = 1.03-1.07, $p<.05$). No meaningful associations were found among medical or socio-demographic factors and receipt of a behavioral health diagnosis.

Higher incidence of behavioral health problems in Active Duty cancer survivors may reflect a unique pattern of stressors inherent to life as a Service Member. The addition of a cancer diagnosis and treatment along with receipt of a behavioral health diagnosis is related to an increase in medical related visits. This is an added burden to the

military health care system and may be attenuated by early detection of and effective treatment for common behavioral health diagnoses such as anxiety and depression.

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CHAPTER 1: Background

PURPOSE AND GOALS OF THE STUDY

The purpose of this doctoral research project was to gather information designed to improve the quality of comprehensive cancer survivorship care, defined as detection and management of concurrent behavioral health problems, in the Military Health System. To fulfill this purpose, the goals of this project were to: determine whether Active Duty cancer survivors experience differences in behavioral health care as compared to military-affiliated civilian cancer survivors; and discern how the behavioral health needs of Active Duty cancer survivors are currently being met.

This project was inspired by a report on the transition from cancer patient to cancer survivor published by the Institute of Medicine (IOM) in 2005. In this report the IOM recommended that researchers conduct future studies to raise awareness of survivorship as a discrete phase of cancer care; to raise awareness of the psychosocial sequelae of cancer; and to further inform the medical community about what needs go into a cancer survivorship care plan or procedure designed to assist in follow-up care for cancer survivors. This project is important because it supports these recommendations. Furthermore, the focus is placed on Active Duty cancer survivors because little is known specifically about this population. Including a military-affiliated civilian comparison group (who receive care within the same managed healthcare system) provides information regarding the generalizability of study findings. Behavioral health concerns are a substantive problem for cancer survivors and U.S. service members. Examining incidence of behavioral health diagnoses and patterns of follow up treatment as a result from both a cancer diagnosis and Active Duty military service will inform the healthcare community about a high-risk population which has not been widely studied. By informing providers about the incidence and prevalence of behavioral health problems in cancer survivors, they may be better able to anticipate, identify, and treat these problems in the context of cancer survivorship care (136). These findings support the secondary purpose of this project, which is ultimately to improve cancer survivorship care within the Military Health System.

Brief research procedure

This study used Military Health System (MHS) data to investigate utilization and patterns of physical and behavioral healthcare in Active Duty cancer survivors with and without a concurrent behavioral health diagnosis. These patterns were determined by examining the frequency and types of behavioral health diagnoses and treatments as well as the frequency and types of non-behavioral healthcare interventions in this sample.

What this dissertation includes

This dissertation includes operational definitions of important terminology and a brief review of: cancer epidemiology in the U.S. military and civilian populations; cancer survivorship as a concept; behavioral health epidemiology in U.S. military and civilian populations; behavioral health problems in cancer survivors; and trends in behavioral healthcare. These sections are provided to justify the need of this research. This dissertation also contains the methodological and statistical procedures and results of the study as well as limitations and clinical implications of this research.

OPERATIONAL DEFINITIONS

Military/Active Duty

For the purposes of this research, individuals identified as *military* or *Active Duty* are men and women, Active Duty or Reserve personnel, who are eligible to receive healthcare through the Military Health System.

Military-affiliated civilian (MAC)

In this study individuals referred to as *military-affiliated civilian (MAC), civilian,* or *non-Active Duty* are men and women who are sponsored by an Active Duty Service Member in order to receive care in the Military Health System. While these individuals are not Active Duty, the investigators would like to recognize that they are nevertheless connected closely to military service through their Active Duty relatives (parents, spouses, etc).

Additional operational definitions for key terms utilized in this doctoral dissertation are provided in Appendix A on page 71.

BACKGROUND

U.S. Cancer Epidemiology

The epidemiology of cancer is described in this section to include cancer incidence and survival rate trends from the last 40 years. This section is presented to highlight that cancer survivors are being diagnosed younger and living longer, which is relevant because a large percentage of military personnel are under the age of 40.

Data from NCI's Surveillance Epidemiology and End Results Program (SEER) indicate that as of January 1, 2010, there were 13,027,914 Americans currently living with a cancer diagnosis (1). SEER estimates predict that there will be more than 1.6

million new cases of cancer in the U.S. in 2013, with the most frequently diagnosed cancer sites being prostate, breast, lung, colon, and skin, respectively. Subsequent SEER data reveal that among cancer patients diagnosed between 2006-2010, 23.1% were diagnosed with cancer while under the age of 54, leaving a sizeable working-age population of cancer survivors. Currently, SEER data report that 65.8% of people diagnosed with cancer between 2003-2009 survived a five year period, consistent with the definition of long-term cancer survivor.

Although individuals under the age of 45 account for only about 10% of newly diagnosed cancer cases in a given year, SEER data indicate that cancer incidence in young people is increasing. From the 1970's to the late 1990's, incidence of cancer (all types) has increased annually more in age group 15-29 than in either children or adults older than 29 alone (1; 145).

These statistics are relevant to the U.S. military because the military as a whole has a disproportionately young population. As of 2012, the average age for all Active Duty Service Members is 28. Of the roughly 1,411,425 Active Duty personnel, 56% of military officers are 35 or younger, with the largest percentage of officers (23%) falling within the 26 to 30 age group. Approximately 85% of enlisted Service Members are 35 or younger, with the majority of enlisted personnel (49%) in the 25 or younger age group (8). These statistics highlight the importance of this research proposal because young cancer survivors are a population on which historically little research has been done (146).

The Military and Cancer

Within the Military Health System (MHS) from 1990-2004 the most commonly diagnosed cancers were: testicular, prostate, breast, and colorectal, respectively (32; 147), mostly consistent with national cancer rates. Recent data indicate that from 2000-2011, 9,368 Active Duty Service Members were diagnosed with cancer, and that 8,183 of these individuals are long-term cancer survivors (32). Since long-term cancer survival rates in the military are improving alongside national cancer survival rates, improving cancer survivorship and return to work is an important concern for the Armed Forces (32).

Within the MHS there were 11,014 cases of new cancer diagnoses from 2006-2007 alone, with 878 of those being either Active Duty or National Guard and Reserve Service Members eligible for healthcare within the MHS (54). Because military readiness is one of the main goals of the MHS, improving the understanding and conceptualization of cancer survivorship care will help future Active Duty cancer survivors make full and expedient recoveries, serving both the military's mission and improving care for Service Members.

In the sample for the present study, descriptive analyses revealed that the most prevalent cancer diagnoses were: skin melanomas and other non-epithelial skin cancers (21.8%); prostate (16.8%); breast (13.7%); and thyroid (12.7%), which is similar to cancer data from the general U.S. population (124). Although similar to general U.S. data, these findings appear to be slightly different from previous epidemiological data in U.S. Service Members. However, there are several important points to consider. SEER lists the median age at cancer diagnosis as 66 years, with the majority of new cancer diagnoses in the U.S. occurring in 65-74 year olds (14). The mean age in this sample was

45.51 years. By utilizing a younger population for this study, the likelihood of finding occurrences of cancers with commonly later age of diagnosis such as colorectal (14) becomes much smaller. Testicular cancer, which has a historically lower age of onset (e.g., age 33) (14), has a much less frequent rate of diagnosis at only 5.6 per 100,000, making it less likely to be found in the sample when compared to cancers with higher incidence rates such as skin (21.3 per 100,000) or thyroid cancer (12.9 per 100,000). The following section will outline detailed information concerning detection, treatment, and survivorship for each of the most frequent cancers found in this sample.

Skin cancer

Skin cancer is the most commonly diagnosed cancer worldwide (62). It is classified into two primary diagnostic groups: malignant melanomas, and non-melanoma skin cancers (NMSC) (62). Non-melanoma skin cancers generally have excellent prognoses when detected and treated early (62); non-melanoma skin cancer epidemiology is also difficult to track as it is not required to report cases of these cancers to national cancer registries (62; 124). Malignant melanomas are varied in their clinical presentations and have much poorer prognoses than non-melanoma skin cancers. Malignant melanomas make up only 4% of new skin cancer cases per year; however they are responsible for 65% of skin cancer deaths annually (62). Skin cancers are caused by a variety of pathogenic mechanisms. The majority of these are a direct result of ultraviolet ray exposure (62; 86). Ultraviolet ray exposure due to sunlight or artificial light results in damage to DNA (primarily through damage to tumor-suppresant and other genes), which causes maladaptive cellular processes, inflammation, immunosuppression, and ultimately cancer (62; 86; 133).

While new technologies to detect skin cancers are currently being developed, the majority of cases are diagnosed upon visual inspection according to the ABCDE screening matrix and a subsequent tissue biopsy (66; 128). The ABCDE cancer screening matrix is a tool used by clinicians to stratify suspicious growths according to: **A**symmetry, **B**order irregularity, **C**olor, **D**iameter (must be greater than 6mm), and **E**volution, **E**levation, and/or **E**nlargement of a lesion (66). Risk factors for skin cancer include: fair skin, lighter hair/eye color, familial skin cancer history, UV ray exposure, history of sunburn, and poor sun exposure protection habits (62).

Treatment for skin cancer varies greatly and is dependent on location and type of cancer growth. Treatment options include: topical medications; cryosurgery (freezing with liquid nitrogen); curettage and/or surgical excision; and brachytherapy (or radiation therapy) (86). Survival rates for skin cancers are generally the highest amongst all types of malignancies, and continue to rise with improvements in diagnostic and treatment advances (140). Survival rates range widely depending on staging, location, and histology of the malignancy (62). When caught early, localized skin cancers that have not metastasized comprise 84% of all new skin cancer diagnoses and have an excellent prognosis (1). These cancers have a roughly 98.1% five-year survival rate, while metastasized skin cancers comprise 4% of all newly diagnosed cancers and have a 16.1% five-year survival rate (1). These statistics emphasize the importance of early detection as well as the need to study long term cancer survivorship in this population.

Prostate cancer

Prostate cancer is another cancer that is very common and has a very high survival rate when caught early (118). Apart from skin cancer, prostate cancer is the most frequently diagnosed cancer in males in the United States (128). Since the majority of prostate cancer diagnoses do not lead to death, it is important to consider the long-term physical and psychosocial effects of this diagnosis (115; 118). Prostate cancer is classified according to tumor stage and grade as well as risk category. Risk categories are: very low risk, low risk, intermediate risk, high risk, and very high risk (137). The use of these categories is a valuable tool for provider-patient communication, especially when trying to guide patients through the decision making process of if and how to undergo treatment for this diagnosis.

Although the majority of men with prostate cancer are over the age of 40 at diagnosis, due to advanced, and somewhat controversial, screening procedures, prostate cancer can often be detected well before this age (27; 118). Prostate cancer is detected through a combination of a physical exam, prostate-specific antigen (PSA) screening, and biopsy as indicated (60; 115). Routine use of a PSA test to screen for cancer is under debate, as low PSA levels (PSA < 10 ng/ml) do not definitively rule out existence of a tumor, and can lead to over-treatment for tumors that may not end up being problematic for the patient and/or have little chance of becoming aggressive, high-risk tumors (115; 118).

When a patient does elect to undergo treatment, their options include: active surveillance; prostatectomy; radiation; chemotherapy; androgen deprivation therapy, or a combination thereof (137). The majority of these treatments carry serious side effects. These can include erectile dysfunction, urinary incontinence, bowel dysfunction, anxiety, depression, and fatigue (118; 121; 137). Since prostate has such a favorable survival rate, identifying and supporting the side effects and survivorship needs of these patients is critical to ensuring optimal post-cancer care.

Breast cancer

Over the last forty years breast cancer incidence has increased substantially. This increase has been linked to advances in screening technology, longer life expectancy, and rising obesity rates and use of hormone replacement therapies (45; 103; 143). Breast cancer is the most frequently diagnosed cancer in women and the second leading cause of cancer deaths in women (45; 132; 144). Currently an American woman has a 1-in-8 chance of being diagnosed with breast cancer as compared to 1-in-11 in 1970 (45). It is important to note that it is estimated that military women have higher rates of breast cancer than the general U.S. population (31; 147). Previous research has postulated this phenomenon may be due in part to stringent annual screening requirements or occupational exposure to risk factors (30; 147).

Breast cancer is detected through clinical examination, mammography, and biopsy (45; 132; 144). It commonly occurs in patients over 40; when breast cancer is diagnosed in younger patients, it tends to be more aggressive (e.g., less differentiated, larger) and have poorer outcomes (144). Stage at diagnosis is very strongly associated with 5-year prognosis (144). Deaths due to breast cancer have decreased by 34% since 1990 also due to earlier detection and other medical advances (45). In the United States, 5-year survival rates of localized breast cancer were roughly 99% compared to a 23% 5-year survival rate for metastasized tumors (144).

Breast cancer treatment can involve a combination of surgical intervention (lumpectomy or mastectomy), radiation, chemotherapy, and/or adjuvant hormone therapy (103; 143). Treatment is dependent on tumor histology, localization, and patient choice (103; 143). Younger patients often opt for more aggressive treatments (to include preventive breast removal) while patients with more advanced cancers or in later stages of life undergo palliative treatment (143).

Breast cancer survivorship is an important focus in the cancer survivor community. Because survival rates are so high, the post-treatment experience of breast cancer patients has received a great deal of focus in research literature (52). Common symptoms associated with breast cancer survivorship are: fatigue; anxiety; depression; changes in work status; edema; gastrointestinal distress; problems with sexual functioning; and cognitive dysfunction (28).

Thyroid cancer

Thyroid cancer accounts for roughly 2% of cancers in the U.S. (77). Thyroid cancer occurs more frequently in females and is the fifth most common cancer in American women (77). The incidence of thyroid cancer is rapidly increasing due to more advanced detection and diagnostic procedures (77; 120). Thyroid cancer is generally believed to stem from either environmental (e.g., exposure to radiation or other carcinogens, dietary iodine content, etc.) or biological (elevated thyroid-stimulating hormone (TSH) levels, genetics) factors (120). There are several forms of thyroid cancer, with differentiated thyroid tumors, or papillary thyroid carcinomas, accounting for anywhere from 80 to 90% of all new cases (24).

Thyroid cancer is detected and diagnosed through a physical exam and ultrasound and needle biopsy procedures (108; 120). It is staged according to tumor size, differentiation, patient age, and invasion of surrounding or distant tissues (77). Treatment often has favorable outcomes, yet it is very complex due to the location and nature of the thyroid gland and often involves numerous providers from different specialties such as endocrinology, surgery, and even nuclear medicine (120). Thyroidectomy or lobectomy are the preferred treatments for thyroid cancer, however treatment with radioactive iodine, radiation, chemotherapy, and/or thyroid hormone therapy are also often used in conjunction or in lieu of surgical procedures (24; 120).

Throid cancer has widely varied, yet relatively favorable survival rates. The 5-year survival rate of a well-differentiated thyroid tumor (which comprise the majority of new diagnoses) is 97% versus almost 0% 5-year survival rate for anaplastic thyroid tumors, an aggressive, highly invasive form of this cancer (120). Upon completion of treatment, thyroid cancer survivors are often able to resume social and occupational functioning, however they report many problems typical to cancer survivors: emotional problems (depression, anxiety), interpersonal and relational problems, edema, cognitive dysfunction, pain, fatigue, sleep disturbance, and vocal difficulties (72).

Cancer survivorship

Cancer survivorship became a formal concept in the mid 1980's (58). This term was designed to function as a means to formally recognize the multitude of challenges and struggles faced by patients once anti-cancer treatment ended. The need for this term follows improvements over the last few decades in cancer detection and treatment. Twenty years ago about 50% of cancer survivors would be expected to reach long-term survivorship; today an average of 67% of cancer survivors are expected to live five years or more beyond their initial cancer diagnosis (58; 113). As more cancer survivors transition into long-term survivorship, the distinct challenges they face are becoming an increasingly important component of their healthcare.

Cancer survivorship often involves physical symptoms such as: fatigue, insomnia, pain, cognitive impairments, and edema, as well as emotional symptoms such as depression and anxiety (113). Fatigue is one of the most commonly reported symptoms in cancer survivors, and is one of the strongest predictors of decreased health-related quality of life (HRQOL) (113). Fatigue and other symptoms factor prominently into cancer survivors' HRQOL, which is often rated as low among these individuals. Cognitive dysfunction in cancer survivors is often referred to as "chemobrain" and has become increasingly recognized by the medical and scientific communities in the last ten years (19; 139). This phenomenon is also associated with fatigue, depression, and reduced quality of life. In addition, cancer survivors are faced not only with the consequences of cancer treatment, but also with related chronic health conditions such as high blood pressure, back pain, diabetes, and obesity (65).

Cancer survivors often report living with increased health concerns and the fear of recurrence (65). As a result, cancer survivors often have increased rates of healthcare utilization compared to non-cancer peers (90). While cancer survivorship involves a complex combination of physical and psychosocial challenges, the concept of cancer survivorship care is still evolving and primary care physicians struggle with formulating a comprehensive strategy to manage the care of these patients (58). Cancer survivorship care plans are now routinely being distributed by healthcare facilities (49); however, a lack of face-to-face time with providers and perception of a poor doctor-patient relationship may strongly negatively influence how closely these plans are followed (49; 55).

Economic and occupational challenges are also a large part of cancer survivorship. Financial worries are a common burden on cancer survivors. Even when cancer patients have employer-sponsored healthcare insurance, many out-of-pocket expenses are nevertheless incurred by this group (95). Transportation, copayments, medications, and loss of salary are all non-reimbursed costs routinely incurred by cancer survivors (95). Additionally, many cancer survivors are confronted with the reality of insurance cost-sharing practices, lifetime maximum benefit limits, and the loss of health insurance if they become too ill to work. As an example, 60% of the cost of treating prostate cancer, which is the most commonly diagnosed cancer among males in the U.S., is estimated to be paid for through out-of-pocket expenses (75). For those men, the average monthly out-of-pocket cost (including imputed indirect costs) was: $3793 (3 months after treatment), $1955 (6 months after treatment), $766 (12 months after treatment), and $665 (24 months after treatment) (75).

Financial concerns have been shown to have significant influence on oncologists and patients when deciding which treatment regimens to recommend, medications to prescribe, and prescriptions to fill (107). The proposed research project presents a unique research paradigm: younger cancer survivors (considered to be adults between ages 18-29) are less likely to possess health insurance and more likely to delay seeking care (146). By using data from a sample of Service Members, we are gaining access to a young population of cancer survivors in which every patient is covered under TRICARE, receiving arguably some of the world's most comprehensive healthcare coverage. This aspect alone lessens the influence of cost, which is one of the most frequently cited barriers to care (44); Active Duty TRICARE beneficiaries generally pay no to nominal fees for services. This universal and low- or no- cost healthcare also may mitigate effects of other sociodemographic characteristics that often influence health-seeking behaviors such as: age, education, ethnicity, and socioeconomic status (SES) (44).

Resuming work is viewed as an important piece of a cancer survivor's recovery, symbolizing a return to normalcy and regaining one's identity (112; 116). As a result of incurring a cancer diagnosis, many survivors are forced to work fewer hours, take lower paying positions to lessen their scope of work responsibilities, quit, or retire as a result of being unable to meet occupational demands (87; 101). These financial, medical, and interpersonal concerns are often overwhelming to the cancer survivor and frequently culminate in feelings of distress and behavioral health disorders.

Behavioral Health

Psychosocial stressors and behavioral health problems are common among cancer survivors. Depression and emotional distress are some of the most frequently reported symptoms in cancer survivors (84). Even when behavioral health disorders are not formally diagnosed, distress is often a significant component of cancer survivorship (26; 123). It is important to consider that behavioral health disorders among all Service Members account for a substantial portion of missed work days, disability, utilization of healthcare, and separation from Active Duty (34). Behavioral health conditions accounted for more inpatient hospitalizations and outpatient hospital visits than any other condition (except musculoskeletal disorders and routine visits) in Active Duty personnel during 2011 (11). This information is presented to bring attention to the high prevalence of behavioral health disorders, the complexities of behavioral healthcare in the military, and how these phenomena may ultimately influence cancer survivorship.

Military-specific risk factors for behavioral health disorders

As trends in civilian behavioral health care have changed over the last few decades, the military also has seen a shift in the behavioral health of military personnel in the last decade. Military members are frequently faced with stressors that many of their civilian counterparts will never experience (9). Some of these stressors include: frequent moves and changes of duty station; year-round training and deployments that often separate Service Members from their families for days to months at a time; and deployment to combat zones where exposure to violence and other traumatic events are commonplace. All of these stressors combined with risk factors for mental illness, such as younger age, single marital status, lower education, and a military culture that rewards “toughing things out,” place Service Members at a much greater risk for mental and emotional distress than non-military citizens (135).

As a result, over the last eleven years the rate of behavioral health disorders in the military has dramatically increased. Since 2010 suicide has become the second leading cause of death among Service Members, second only to injuries sustained in combat (10). Between 1998-2011 almost 3,000 individuals in the military died by suicide (10).

Stigma

The rate at which Service Members seek behavioral health services is not commensurate with estimated prevalence of behavioral health and emotional concerns (135). Unfortunately, the stigma associated with “looking weak,” to include behavioral health diagnoses and seeking behavioral health treatment, is great enough to dissuade many Service Members from actively seeking assistance for emotional issues (135). Additionally, many military regulations still allow for the separation of a Service Member if and when certain behavioral health diagnoses are assigned (4). While the number of behavioral health-related discharges, or "Chapters" have decreased over the last two decades, the stigma and fear associated with behavioral health concerns still persist within the military (9)

In recent years various branches of the military have enacted their own anti-stigma campaigns. While preliminary results are positive (9), the long-term effects of these programs are still largely inconclusive (91). Actions have included: mandatory training on behavioral health issues, renaming "mental health" as "behavioral health," integrating behavioral health providers into units, and easing restrictions on types of behavioral health diagnoses that are allowed in Active Duty personnel. Despite these efforts, the military (and the U.S. in general) is also currently facing a shortage of behavioral health providers, complicating the military's ability to provide quality behavioral healthcare (9)

Rationale

This research is intended to fill gaps in the literature regarding Active Duty cancer survivorship needs. Additionally, as cancer survivorship continues to increase in recognition, the results of this project will inform the importance of studying cancer survivorship as a distinct entity, and will specifically contribute to the literature regarding the psychosocial aspects of cancer survivorship. This study is important as it may ultimately improve cancer survivorship care in the MHS.

CHAPTER 2: Specific Aims and Hypotheses

SPECIFIC AIM #1

To determine the distribution of behavioral health diagnoses in Active Duty cancer survivors as compared to military-affiliated civilian cancer survivors in the Military Health System

> **Hypothesis 1a**: The frequency of behavioral health diagnoses among Active Duty cancer survivors will be higher than the frequency of behavioral health diagnoses among military-affiliated civilian cancer survivors.
>
> **Hypothesis 1b**: The frequency of mood disorders will be greater than the frequencies of other behavioral health disorders among Active Duty and military-affiliated civilian cancer survivors.

Rationale: Rates of behavioral health problems in the military as a whole have significantly increased over the last ten years (11; 34). Not only must Active Duty cancer survivors contend with the stressors associated with a cancer diagnosis, they are also exposed to stressors which are not found in the civilian population such as: lengthy deployments, short dwell times, and frequent permanent change of station (PCS) moves. It is expected that Active Duty cancer survivors will have greater levels of behavioral health problems than military-affiliated civilian cancer survivors as a result of exposure to both military and cancer-related stressors. Specifically, this project proposes that depressive disorders will be the most frequently diagnosed class of disorders in our sample. Research has found that depressive disorders are estimated to occur in 30 to 50%

of cancer survivors (67; 69; 84) and as many as 30% of non-cancer primary care patients (100).

SPECIFIC AIM #2

To determine if there are demographic or medical predictors of receiving a behavioral health diagnosis in Active Duty cancer survivors as compared to military-affiliated civilian cancer survivors in the Military Health System

Hypothesis 2a: Cancer severity (as determined by 5-year survival rate), radiation therapy, and chemotherapy, will be positively associated with a behavioral health diagnosis among Active Duty cancer survivors.

Hypothesis 2b: Age, male gender, married marital status, and military rank will be negatively associated with receiving a behavioral health diagnosis among Active Duty cancer survivors.

Hypothesis 2c: Military-affiliated civilian cancer survivors will show associations between psychosocial and medical variables and behavioral health diagnoses similar to those of Active Duty cancer survivors.

Rationale: Cancer is a difficult illness to treat; more advanced cancers often require more aggressive treatments, which are very difficult on the survivor. The side effects of radiation and chemotherapy are documented to often be extreme and frequently disabling, heightening cancer survivors' distress (15; 142). Based on tumor stage and site, some cancers are more complicated and invasive to treat than others. Depending on the part of the body where the tumor(s) is located, the side effects of treatment may result in lasting impairments on a survivor's functioning, increasing difficulty returning to pre-cancer levels of functioning, and often resulting in greater experience of distress and behavioral health problems (129). Higher age, male gender, and married marital status have been reported in previous research to be protective factors against behavioral health problems in studies of non-cancer individuals (130). However, the research is largely inconclusive whether these same protective effects occur in cancer survivors (129). Female gender and being of an ethnic minority have been risk factors for experiencing distress and other behavioral health problems in the non-cancer population (117; 130). Additionally, Active Duty members are exposed to occupational and psychosocial stressors not seen in the civilian community which place them at risk for behavioral health problems.

SPECIFIC AIM #3

To determine the type and frequency of follow-up care received for behavioral health diagnoses among Active Duty cancer survivors as compared to military-affiliated civilian cancer survivors in the Military Health System

Hypothesis 3a: Receiving a behavioral health diagnosis will be positively associated with the number of physical health encounters among Active Duty and military-affiliated civilian cancer survivors.

Hypothesis 3b: Prescription psychopharmacologic therapies will show a greater positive association with a behavioral health diagnosis than psychotherapy among Active Duty and military-affiliated civilian cancer survivors with a behavioral health diagnosis.

Hypothesis 3c: The positive association between psychopharmacologic therapies and behavioral health diagnoses will be greater for Active Duty cancer survivors than for military-affiliated civilian cancer survivors in the Military Health System.

Rationale: Depression and distress are often under recognized in cancer survivors by their physicians (69; 129). Patients with unrecognized behavioral health concerns, both with and without a cancer diagnosis, often incur more primary care visits before and after receiving a behavioral health diagnosis than patients with no behavioral health problems (90). In the military, not only is there a stigma associated with behavioral health treatment (9), but psychopharmacotherapy may function as a more efficient means to obtain treatment when compared to psychotherapy. In the Army alone, there was a roughly 6% increase in number of prescription psychotropic medications from FY2010 to FY2011 (9).

SPECIFIC AIM #4

To determine if the incidence of behavioral health diagnoses decreases with time from cancer diagnosis among Active Duty cancer survivors as compared to military-affiliated civilian cancer survivors in the Military Health System

Hypothesis 4: Time since termination of cancer treatment will be negatively associated with assignment of a behavioral health diagnosis among Active Duty and military-affiliated civilian cancer survivors.

Rationale: Literature indicates that many behavioral health problems will remit with time, even when untreated (29; 61; 127). However, research in the cancer survivor population is inconclusive. Some research in civilian cancer survivors indicates that distress often peaks during treatment, but tapers off after the first year following cancer diagnosis (141), while other studies indicate a more stable trajectory of cancer-related symptomatology over time (83). No studies to date have investigated the trajectory of distress among military cancer survivors.

CHAPTER 3: Method

OVERVIEW

This research project was a secondary analysis of data that were initially gathered in 2011 by Dr. Diana Jeffery, a TRICARE Research Analyst, for the purpose of identifying healthcare utilization patterns and costs among TRICARE-eligible cancer survivors. For the present project, portions of this dataset were used to compare Active Duty cancer survivors with and without a behavioral health diagnosis to TRICARE-eligible military-affiliated civilian cancer survivors. This project studied predictors, frequencies, types, and treatments of behavioral health diagnoses in Active Duty cancer survivors. Military-affiliated civilian TRICARE beneficiaries were utilized as a comparison group.

A data sharing agreement application (DSAA) was submitted to TRICARE Management Activity (TMA) in August of 2013 and approved on December 3, 2013. TMA is the governing agency which oversees usage of MHS data for research-related purposes. This application requests permission to use TMA data in research activities and future scientific publications. Additionally, a USUHS Form 3202 (USUHS Student and Resident Physician Research Proposal) was submitted to the USUHS Office of Research in August 2013 requesting approval as a Non-Human Subjects Research (NHSR) project. This research was approved as non-human subjects research on September 17, 2013 and therefore was exempt from a full IRB review.

Several variables were not included in the original dataset. An amendment to the original TMA data sharing agreement was submitted in April, 2014. The agreement was approved on May 15, 2014, and the variables for ethnicity and branch of service were requested for the purposes of data analysis. However, the data for these variables were largely incomplete or missing, and therefore unable to be included in final study analyses.

DATA COLLECTION

Subjects

Identification of subjects

A primary aim of this project was to compare Active Duty cancer survivors with military-affiliated civilian cancer survivors in the Military Health System. To accomplish this aim, study analyses were conducted with matched pairs comprised of one Active Duty cancer survivor and one military-affiliated civilian cancer survivor. Pairs were matched on the basis of cancer type, gender, marital status, and age. Power analyses (see section below for details) revealed that to obtain a power of 0.8, a minimum of 139 Active Duty subjects were needed. To obtain a comparable comparison group, the military-affiliated civilian cancer survivor group was likewise screened for a minimum of 139 subjects. Based on the parameters established above for pairing subjects, during the selection process a total of 394 individuals (197 Active Duty, 197 military-affiliated civilian) were identified who met all criteria. This maximum number of individuals available was included in its entirety and formed the final study sample with a total of N = 394. This surpassed the minimum requirement of N = 278.

The study utilized data collected according to a procedure outlined by Fox et al. (2013). For the purposes of the Fox et al. study, medical files from cancer survivors diagnosed within the Military Health System between FY06-FY07 were gathered from the Military Health System Data Repository (MDR) in 2011. The total sample size for the original study included all eligible TRICARE beneficiaries (Active Duty and military-affiliated civilian) between the ages of 18-64 with N=11,014. Of this group, 878 were Active Duty military personnel. Individuals were included in the sample if they received an active anti-cancer treatment during FY06 or FY07, but no active anti-cancer treatment in FY08. Anti-cancer treatments were defined as cancer-related surgery, primary/initial chemotherapy, and/or radiation therapy. Individuals who also received secondary cancer treatment (or adjuvant treatment) during this time including hormonal therapy or secondary chemotherapy were retained in the sample. Subjects had to have at least one medical encounter in FY10 to ensure that they were still alive. Individuals who died during the study years were excluded from the final sample.

Power analyses and sample size

Sample size and power analysis calculations using G*Power software (Version 3.1.6) were conducted to estimate whether the pool of subjects would be sufficient for the purposes of this proposed study. *A priori* power analyses were conducted using power levels set at 0.8 for each planned procedure. Power levels of 0.8 are widely accepted in social science research, and represent a moderate power level indicating that there is an 80% chance that this study will find a true relationship should one exist (64). Based on power analyses detailed below, the study required a minimum of 139 Active Duty and 139 matched military-affiliated civilian individuals. The final sample included 394 individuals (197 Active Duty, 197 non-Active Duty) matched on the basis of cancer site, age, marital status, and gender. Detailed power analyses for each planned procedure are presented below.

Chi square

Power and effect size calculations were performed to estimate needed sample size and predicted statistical power for Chi square comparisons aimed at investigating demographic characteristics of the sample. Analyses employing two groups with various numbers of dependent variables were examined. Power levels of 0.8 and medium effect sizes (w=0.3) (39) were found for Chi square models employing: two dependent variables (sample size of N=88 needed), three dependent variables (N=108 needed), four dependent variables (N=122 needed), five dependent variables (N=133 needed), six dependent variables (N=143), seven dependent variables (N=152), eight dependent variables (N=160), and nine dependent variables (N=167). Chi square analyses contained no more than nine dependent variables.

Regression analyses

To find a moderate association between variables (OR=1.6), a sample size of N=182 was needed for logistic regression analyses (51). For multiple regression analyses, N=158 (total sample size) was required to reach a power level of 0.8. The study sample size of N=394 is sufficient to meet these targets.

Procedure

Data were collected during a query of the Military Health System Data Repository (MDR). MDR is a collection of databases that include demographic information, healthcare encounters, and pharmacy data. The Defense Enrollment Eligibility Reporting System (DEERS) was accessed to obtain demographic information. Military Treatment Facility (MTF) records were accessed through the following databases: the Standard Inpatient Data Record (SIDR); the Standard Ambulatory Data Record (SADR); and the

Pharmacy Data Transaction Services (PDTS) for outpatient pharmacy fill data. Cancer types included: prostate, lung, testicular, breast, ovarian, cervical, other gynecological, colorectal, bladder, liver, pancreatic, kidney, head and neck, brain, lymphoma (Hodgkins and non-Hodgkins), melanoma, stomach, esophageal, or "other." Identifying information was removed and patients were assigned a unique pseudo-identifier for research purposes.

Because the original study involved use of de-identified archival data, it was determined and approved by TMA that there is no need to contact the people from whom the data were collected (76). Moreover, this investigator did not have access to any information that would identify the people about whom the data are based. After data use and research approvals from both USUHS and TMA were obtained, the dataset was copied as password-protected files onto compact discs and taken into possession by this investigator. Upon completion of data analysis, the compact discs containing the data were destroyed.

DATA ANALYSIS

Research design

This project is a longitudinal matched-cohort design. The archival data were collected from FY06 through FY10. Data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 20, SAS software (originally Statistical Analysis System) version 9.3, and STATA version 12.1.

Preliminary analyses

Obtaining raw data: Data were originally extracted from the MDR in 2011. The data included individuals who received a cancer diagnosis between 2006 and 2007 and who had completed primary anti-cancer treatment by 2008. The original extraction also included only those individuals who were alive in 2010 as defined by evidence of at least one medical encounter in 2010. The original sample contained all eligible adults between ages 18-64.

Study data were available in SPSS and SAS formats; therefore no coding of raw data was necessary for this project. Upon receiving the data, the investigator examined the data to identify missing data points and outliers. The distributions of variables were examined for normality. Initial data analysis consisted of descriptive analyses run to obtain information on the sample's demographic and medical characteristics. This step of data analysis also included investigating potential covariates (see detailed section below). Regression analyses were conducted to investigate proposed specific aims and hypotheses.

Examination of demographic variables: Descriptive Chi square analyses using military status (Active Duty vs. military-affiliated civilian) as the independent variable were conducted as part of Specific Aim 1 to examine several variables included in the study as either matching variables, covariates, or both: age, gender, military rank, marital status, cancer site, cancer severity (as defined by 5-year survival rate), time since diagnosis, and type of cancer treatment received. Detailed data on demographic and medical variables are available in the tables provided at the end of the manuscript.

The study subjects were matched on the basis of cancer site, age, gender, and marital status. These variables were also included in the regression models as predictor variables. The practice of entering matching variables into regressions is appropriate given that this study employed unconditional regression models (85), and also that these variables have been shown in previous research to be associated with behavioral health disorders as well as health outcomes (18; 20; 46; 48; 53).

Analytic plan

Data analyses were conducted using *a priori* alpha levels set at 0.05 (51). One-tailed tests were used because all study hypotheses are directional (51). Additionally, conservative alpha levels mitigate the risk of making a Type I error. The analytic plans for study aims #1-4 are listed below:

Specific Aim #1: To determine the distribution of behavioral health diagnoses in Active Duty cancer survivors as compared to military-affiliated civilian cancer survivors in the Military Health System

To test Specific Aim #1, descriptive Chi square analyses were used to determine the overall distribution of behavioral health diagnoses as a percentage of the Active Duty sample, as well as the distribution of individual categories of behavioral health disorders (e.g. depressive disorders versus anxiety disorders). The results were compared with the distributions found in the study's military-affiliated civilian cancer survivor sample. Finally, the overall incidence density in Person-time for the four-year period during which the data were collected was computed. To obtain incidence rates, data were calculated as the number of initial behavioral health diagnoses per 1,000 person-years of follow up, stratified by year since the end of cancer treatment.

Specific Aim #2: To determine if there are demographic or medical predictors of receiving a behavioral health diagnosis in Active Duty cancer survivors as compared to military-affiliated civilian cancer survivors in the Military Health System

To test Specific Aim #2, Cox regression analyses were conducted to determine the relationship of select variables with receipt of a behavioral health diagnosis. Since the purpose of these analyses were to investigate the likelihood of an event occurring, Cox regressions were selected because the output of a Cox model is a hazard ratio, or the risk of experiencing the desired event at time t (41; 138). Regressions were conducted utilizing the following categorical independent variables: gender, marital status, military rank (officer/enlisted), ethnicity, cancer site, radiation treatment (yes/no), chemotherapy treatment (yes/no). Continuous independent variables included: age, cancer severity (as determined by SEER 5-year survival data). The dependent variable was presence of at least one behavioral health diagnosis (Yes/No). To compare Active Duty to military-affiliated civilian cancer survivors, interaction terms pairing military status with each predictor variable (e.g. Active Duty*age) also were included in the model.

Specific Aim #3: To determine the type and frequency of follow-up care received for behavioral health diagnoses among Active Duty cancer survivors as compared to military-affiliated civilian cancer survivors in the Military Health System

To test Specific Aim #3 three separate negative binomial regression analyses were utilized. Cox regression analyses were considered, however evidence of over dispersion was found in the data. Negative binomial regressions are regarded as the appropriate alternate analysis technique in instances of over dispersion (59; 126). The first regression included behavioral health diagnosis (“yes” or “no”), military status (Active Duty vs.

civilian), and the interaction term of military status*behavioral health diagnosis as the independent variables, and number of non-behavioral health medical encounters as the dependent variable. The second regression model included the following independent variables: military status (Active Duty vs. civilian), behavioral health diagnosis ("yes" or "no"), and two interaction terms: military status and pharmacologic interventions; and military status and psychotherapy. The dependent variables in this regression were use of pharmacologic interventions ("yes" or "no"), and use of psychotherapy ("yes" or "no"). The third regression was also a negative binomial regression. Military status was the independent variable and use of psychopharmacologic therapies ("yes" or "no") was the dependent variable. While psychopharmacologic therapies were to be defined as drugs listed in section 28:16-Psychotherapeutic Agents in the AHFS Drug Information Database-2014, upon receipt of the data it was noted that a variable indicating use of psychopharmacologic drugs was included.

Specific Aim #4: To determine whether the incidence of behavioral health diagnoses decreases with time from cancer diagnosis among Active Duty cancer survivors as compared to military-affiliated civilian cancer survivors in the Military Health System

To test Specific Aim #4 a discreet survival time logistic model was used (68; 98). Traditional logistic regression was considered, however these data include more than one observation per person. Analyses were conducted with SAS software using a general model procedure and the Standard Error was adjusted for multiple observations per person. The full model included the following independent variables: time since diagnosis (in months); military status; and an interaction term of military status and time.

The dependent variable was presence or absence of a behavioral health diagnosis for each person at each time point.

Chapter 4: Results

DEMOGRAPHIC CHARACTERISTICS

Sociodemographic Characteristics

The mean age for individuals in the sample was 45.51 years (SD = 7.92). Of the Active Duty subjects, 92 individuals, or 46.7% were under the age of 45 and 105 individuals, or 53.3% were over the age of 45. Age was one of criteria on which this sample was matched, and as a result the civilian subjects showed equivalent age characteristics (92 people under age 45, 105 people over age 45).

The majority of the sample were male (64.0%), married (76.1%), and had a sponsor with Enlisted rank (66.8%). Active Duty and military-affiliated civilian cancer survivors had equal numbers of males (126 Active Duty males, 126 civilian males), females (71 Active Duty, 71 civilian), and married individuals (150 Active Duty, 150 civilian). There were 102 enlisted and 95 commissioned officer cancer survivors among the Active Duty group. For military-affiliated civilian cancer sponsors, there were 161 enlisted sponsors and 36 commissioned officer sponsors.

Amongst service branches, the Active Duty cancer survivor group was primarily Army (42.6%) while the military-affiliated civilian group sponsors were split almost evenly amongst the four service branch groups. Please see table 5 for a detailed list of results.

Clinical Characteristics

There were over twenty different types of cancer diagnoses identified in this study (see Table 6). The most prevalent cancer among Active Duty cancer survivors was skin cancers (n = 37), followed by prostate (n = 33) and breast cancer (n = 27). Military-affiliated civilian cancer survivors showed identical diagnostic frequencies. For analytical purposes, cancer sites were divided into four broad categories: *head and neck cancers* (n = 72); *skin cancers* (n = 86); *genitourinary/gastrointestinal* (n = 118); and *other cancers* (breast, reproductive, blood, bone, unspecified/unknown) (n = 118) (see Table 7).

Active Duty cancer survivors had a mean length of cancer survivorship of 19.56 months from diagnosis (SD = 3.11) and 17.76 (SD = 3.24) months from the end of treatment. Military-affiliated civilian cancer survivors had a mean cancer survivorship length of 19.39 (SD = 3.13) months from diagnosis and 17.79 (SD = 3.03) months from the end of treatment. The overall mean length of cancer survivorship in the sample from diagnosis was 19.48 months (SD = 3.12), and mean length of cancer survivorship after completion of primary treatment was 17.78 months (SD = 17.78).

Specific Aim #1:

Hypothesis 1a:

Fourteen distinct categories of DSM-IV disorders were identified during preliminary analyses (see Table 10). Of these 14 disorders, Mood Disorders (n = 43), Adjustment Disorders (n = 29), and Anxiety Disorders (n = 29) were the most prevalent disorders in the study sample. For analytical purposes the 14 disorders were further collapsed into three categories: Anxiety/Adjustment Disorders, Mood Disorders, and

Other Disorders. Chi square analyses found that there were meaningful differences in the type of behavioral health diagnoses between Active Duty and non-Active Duty groups, as indicated in Table 11. Active Duty cancer survivors had higher incidence of Mood ($\chi^2(1, N = 347) = 5.87, p < 0.05$), Anxiety/Adjustment ($\chi^2(1, N = 347) = 10.65, p < 0.01$), and Other Disorders ($\chi^2(1, N = 347) = 5.90, p < 0.05$), than non-Active Duty cancer survivors.

Hypothesis 1b:

Descriptive analyses found that Mood Disorders were the most prevalent behavioral health diagnoses in the sample. Before categories were collapsed, there were 43 cases of mood disorders in the study sample, which was the highest count of all diagnostic categories.

The overall incidence density in Person-time of the study sample was 65.16 per 1,000 person years. The difference in diagnostic rates between Active Duty and military-affiliated civilian cancer survivors did not reach statistical significance (Exp(B) = 1.27, $p = 0.36$).

Specific Aim #2

Hypothesis 2a and 2b:

Regression analyses indicated that cancer survival rate; receiving radiation therapy; receiving chemotherapy; age; gender; marital status; and military status were not associated with the likelihood of a behavioral health diagnosis for either group (Table 13). Ethnicity could not be included in study analyses due to a large number of study subjects (n = 389) for whom this information was not available.

Hypothesis 2c:

Military-affiliated civilian cancer survivors did not show statistically significant differences among demographic or medical predictors of a behavioral health diagnosis as compared to Active Duty cancer survivors, consistent with the original hypothesis. A full listing of results for Specific Aim 2 is shown in Table 13.

Specific Aim #3

Hypothesis 3a:

The mean number of non-behavioral health encounters for individuals with a behavioral health diagnosis was 93.43 (SD = 92.91). This group had a median of 73.00 non-behavioral health encounters during the study. The mean number of non-behavioral health encounters for cancer survivors without a behavioral health diagnosis was 66.75 (SD = 49.90). The median number of non-behavioral health encounters for this group was 55.00. Negative binomial regressions revealed that these differences were statistically significant ($p = 0.004$), and that individuals with a behavioral health diagnosis had 37.10% more non-behavioral health encounters than individuals without a behavioral health diagnosis. Please see Table 14.

Active Duty personnel had a mean of 88.06 (SD = 79.13) and a median 65.5 non-behavioral health visits. Military-affiliated civilian patients had a mean of 64.93 (SD = 59.88) and a median of 46.50 of non-behavioral health visits (as listed in Table 14). This finding demonstrates that Active Duty personnel had roughly 26% more visits than military-affiliated civilians during the study period. Subsequent analysis revealed that this difference was statistically significant (Exp(B) = 1.35, $p < 0.05$, 95% CI [0.56-0.98]).

Hypothesis 3b:

Individuals with a behavioral health diagnosis were almost three times more likely to receive a psychopharmacologic prescription than individuals without a behavioral health diagnosis (*OR* = 2.92, $p = 0.00$, 95% CI [1.79-4.77]) and over seven times more likely to receive psychotherapy services (*OR* = 7.44, $p = 0.00$, 95% CI [2.86-19.39]). Please reference Table 15.

Hypothesis 3c:

Hypothesis 3c was intended to explore what types of behavioral health treatment are received by cancer survivors. One analysis explored whether Active Duty cancer survivors receive more psychotropic prescriptions than military-affiliated civilian cancer survivors. No meaningful association between psychopharmacologic therapies and presence of behavioral health diagnoses was found when comparing the two groups ($p > 0.05$) (Table 16). However, the association between psychotherapy and behavioral health diagnoses were statistically significant. Active Duty survivors were 76.5% more likely to receive psychotherapy than military-affiliated civilians in the Military Health System (Exp(B) = 1.765, $p < 0.05$, 95% CI [1.09-2.86]).

Specific Aim #4:

Discreet survival time logistic analyses found that the association between time since termination of cancer treatment and incidence of a behavioral health diagnosis was statistically significant (Exp(B) = 1.05, $p < 0.001$, 95% CI [1.03-1.07]). However, in contrast to the original hypothesis which postulated a negative association, the data reveal that the incidence rate of behavioral health diagnoses increased with time during the study. For every month of observation post-cancer diagnosis, an individual was 5% more likely to receive a behavioral health diagnosis. The difference in diagnostic rates between Active Duty and military-affiliated civilian cancer survivors did not reach statistical significance (Exp(B) = 1.27, *p* = 0.36), nor did the interaction term of military status*time (Exp(B) = 1.01, *p* = 0.72).

CHAPTER 5: Discussion

SUMMARY OF RESULTS

The purpose of this doctoral research study was to discern how the psychosocial concerns of cancer survivors within the Military Health System are being met, as well as compare Active Duty and non-Active Duty cancer survivors according to diagnostic categories and healthcare utilization patterns. This was done by investigating whether behavioral health disorder types and frequencies differ among these two groups. Additionally, sociodemographic and medical predictors of behavioral health disorders as well as the types of behavioral health treatment received were investigated. Overall healthcare utilization was also examined and compared between both Active Duty and military-affiliated civilian, as well as those with and without a behavioral health diagnosis.

The justification for this project lies within the quadruple aim of the Military Health System. By more precisely identifying the psychosocial needs and behaviors of MHS patients, physicians and healthcare administrators will be better able to plan and render care, thus improving quality of care, health outcomes, and overall efficiency. Mental and behavioral health problems have been consistently increasing within the military over the last decade (34) and they remain one of the most costly areas in terms of hospital bed days and missed work (12), which further supports the need for this research.

Methodological procedures were primarily designed to investigate differences between Active Duty and military-affiliated civilian cancer survivors. Predictors of behavioral health diagnoses, diagnostic frequencies, types of behavioral health treatments, and overall number of healthcare encounters were examined. Chi square and regression analyses were the primary statistical procedures used to investigate study hypotheses. Regression analyses included: logistic regression, Cox regression, and discreet survival time models.

The study had many important findings. Both Active Duty and military-affiliated civilian cancer survivors with a behavioral health diagnosis had more healthcare visits and more psychotherapy and psychopharmacological therapy than those without a behavioral health diagnosis. Cancer survivors in general were at increased risk for behavioral health problems as the study went on; there was no difference in risk between Active Duty and non-Active Duty subjects.

Active Duty cancer survivors were more likely to receive a behavioral health diagnosis, be treated for one within the MHS, and also had more healthcare encounters than non-Active Duty cancer survivors. No statistically significant medical or demographic predictors of a behavioral health diagnosis for either group were identified.

INTERPRETATION

Specific Aim 1 included two hypotheses and examined the overall distribution of behavioral health problems among cancer survivors. These hypotheses addressed differences in diagnostic frequencies and categories between Active Duty and military-affiliated civilian cancer survivors. Both hypotheses were confirmed, revealing that **Active Duty cancer survivors had a higher incidence of behavioral health disorders overall (hypothesis 1a) and that Mood Disorders were the most prevalent diagnostic group in the entire sample (hypothesis 1b).** Importantly, it was found that **Active Duty cancer survivors have a higher incidence of all behavioral health disorders than military-affiliated civilian cancer survivors**. This finding is consistent with the dramatic increase in behavioral health problems in the military at large over the last ten years as well as consistently higher rates of mental health disorders in military populations as compared to civilian populations (9; 12; 80). Our findings stress that as a whole, cancer survivors in the DoD are not immune to the psychosocial difficulties related to a cancer diagnosis. The high incidence of Mood Disorders is consistent with the literature that has identified depression as a common and highly problematic issue faced by cancer survivors (26; 63; 84; 109; 129). It is also important to consider that the combination of stressors related to active military service and a cancer diagnosis may be putting these individuals at much higher risk for emotional problems than their non-military counterparts.

Specific Aim 2 included three hypotheses designed to investigate potential demographic and medical predictors of behavioral health diagnoses in the Military Health System. Hypotheses 2a and 2b were rejected: **no statistically significant medical (hypothesis 2a) or demographic predictors (hypothesis 2b) of a behavioral health diagnosis were found.** Hypothesis 2c was confirmed; **there was no difference between Active Duty and military-affiliated civilian cancer survivors concerning medical or demographic predictors**. Although analyses investigated common demographic characteristics associated with health disparities such as age and gender, and medical variables, such as cancer severity and type of cancer treatment, **no statistically significant predictors of a behavioral health diagnosis were identified** (57; 89; 124).

The three hypotheses which comprised Specific Aim 3 centered on healthcare utilization patterns and treatments for behavioral health problems. Hypothesis 3a compared individuals with and without behavioral health diagnoses in the study sample on the basis of number of doctor's office visits, speculating that individuals with a behavioral health diagnosis would have more visits. This hypothesis was confirmed. It is well documented in scientific literature that individuals with a clinical or sub-clinical emotional problem present to primary care more often than people who do not (42; 90). It is noteworthy to see that this same pattern was also found during this study. Additionally, Active Duty personnel were found to have more healthcare encounters than non-Active Duty in this study. This difference is important to consider as recent research shows that in 2013 the category "mental disorders" was the second leading cause of morbidity overall and the primary cause of inpatient hospital bed days in the United States military (33). The present study supports these findings that **behavioral health diagnoses are widespread, and are associated with a substantial increase in healthcare utilization and disease burden**.

Hypothesis 3b was rejected. This hypothesis stated that individuals with a behavioral health diagnosis will be more likely to receive psychotropic prescriptions than psychotherapy to treat a behavioral health diagnosis. Although this hypothesis was rejected, it nevertheless yielded important findings. Analyses revealed that **individuals with a behavioral health diagnosis (regardless of military status) were statistically more likely to receive mental health services (psychotherapy and psychotropic prescriptions), and over seven times more likely to receive psychotherapy than cancer survivors without a diagnosed behavioral health disorder**. These results emphasize that psychosocial concerns and stressors remain a substantive problem for cancer survivors (88; 99), and that once they are formally identified, patients desire and undergo behavioral health treatment. Given the estimates of undiagnosed emotional problems in cancer survivors as well as the general patient population (26; 74), **these findings support the need for increased and improved screening for psychosocial distress as well as more mental health providers** (22; 25).

Hypothesis 3c was partially confirmed; **Active Duty cancer survivors were much more likely to receive psychotherapy services than military-affiliated civilian cancer survivors, but not psychotropic medications**. Analyses showed that **psychotropic medications are being prescribed to those cancer survivors without a behavioral health diagnosis, and that there was no meaningful statistical association between a behavioral health diagnosis and receipt of a psychotropic medication**. Given the shortage of mental health providers in the last several years, it is promising that receipt of a behavioral health diagnosis was found to be strongly associated with receiving behavioral health treatment. This finding also potentially speaks to recent anti-stigma campaigns by the military, and may reflect an increased willingness to seek help amongst service members (17).

Specific Aim 4 investigated the relationship between time since cancer diagnosis and risk for a behavioral health disorder. Hypothesis 4 postulated that risk for a behavioral health disorder will decrease with time following a cancer diagnosis. While hypothesis 4 was rejected, it nonetheless yielded noteworthy results as a positive relationship between time and risk for a disorder was found. The finding that **the risk for behavioral health disorders increases with time** could be due to several potential causes, and merits further investigation. Late effects, or emotional and physical symptoms that manifest months to years after treatment, are often cited as a high source of disease burden in cancer survivors, and may be a very likely cause of severe emotional distress (58; 63; 131). These late-onset symptoms combined with the stress of adjusting to life with a chronic illness, transitioning either back to work, or even separating from the military may explain why clinically significant emotional problems did not surface until later in cancer survivorship in this study.

CLINICAL IMPLICATIONS

Improve Screening for Psychosocial Distress

As the DoD increases efforts to improve resilience, identify, and treat emotional distress, these findings highlight that **providers working with Active Duty cancer survivors should be aware that these individuals are at even higher risk for depression and other behavioral health problems, and screen, treat, and refer these patients as necessary**. No significant sociodemographic predictors of a behavioral health diagnosis were identified in this study. This information is relevant to the Military Healthy System as an important indicator that the universal access to healthcare afforded to military members and their families has potentially succeeded in eliminating many of the socioeconomic factor-related health disparities seen in civilian settings. The consistency of health outcomes for DoD cancer survivors is promising. It **further supports the need for consistent use and review of distress screening at all healthcare visits** in order to screen all patients equally and accurately.

Currently physicians of many different disciplines have tools available to them to screen for depression, anxiety, posttraumatic stress disorder, and alcohol abuse. These measures include the Patient Health Questionnaire (PHQ), the Generalized Anxiety Disorder 7-item scale (GAD-7), the PTSD Checklist-Military version (PCL-M), and the Alcohol Use Disorders Identification Test (AUDIT). It is not that new screening measures are indicated, but rather that **physicians, nurses, technicians, and other medical professionals responsible for conducting screenings should be monitored and held accountable for consistent, accurate usage of these tools**. By utilizing and tools that are readily available in DoD facilities to their fullest potential, we may be able to identify individuals in distress sooner and more accurately, and implement treatment at the earliest possible juncture.

Increase Access to Behavioral Health Care - Further the Integration of Behavioral Health and Primary Care

The high frequency of psychotropic prescriptions in the absence of a behavioral health diagnosis and increased primary care visits associated with a behavioral health diagnosis within the MHS may reflect further unmet needs in cancer survivors. **These findings support the need for continued integration of behavioral health professionals within primary care settings** (40). The Military Health System is currently transitioning to a patient-centered medical home model. This practice was implemented as this model of healthcare has been shown to increase access to healthcare, improve the quality of healthcare, and improve the efficiency of healthcare (37; 93). Additionally, this practice will increase the interactions between patients and behavioral health providers as it involves a multidisciplinary team of providers housed in one location (71). This model of healthcare has already shown promising results (105), and efforts to continue expansion across DoD facilities will **increase the ability of behavioral health providers to reach their patients earlier in their course of distress, implementing treatment sooner** and potentially serving as a prophylactic effect against a worsening of symptoms.

LIMITATIONS

Although this study found several important differences between Active Duty and military-affiliated civilian cancer survivors, the data were limited to records from an administrative database. As Active Duty patients receive priority within the Military Health System, it is likely that some of the non-Active Duty cancer survivors received purchased care in non-DoD facilities, or even non-TMA-funded care in conjunction with treatment in military settings that may or may not have been incorporated into their official MHS health record. It is also common for military personnel to seek behavioral healthcare outside of the MHS, often paying out-of-pocket. Extensive data from non-MHS medical encounters were not available for the present study, and diagnostic rates and healthcare utilization in this study may not reflect the complete picture.

TMA has multiple insurance benefit plans, which involve no- to minimal-cost options depending on beneficiary status. While Active Duty personnel pay virtually no out-of-pocket costs, TRICARE beneficiaries who are family members, retirees, or reservists can pay co-pays ranging from $10 to $30 depending on the setting. Differences in healthcare diagnoses and patterns among TRICARE benefit plans were not included in this study, and may potentially influence healthcare utilization.

Additionally, the accuracy of the data collected from medical files as well as the cancer and behavioral health diagnoses assigned to study subjects cannot be confirmed. Reliability and consistency in medical record data entry was also not assessed.

Although some differences in diagnostic frequencies, responses to psychosocial stressors, and health behaviors have been found between males and females (16; 35; 48; 78; 88), study analyses were not split according to gender. During initial data organization, the study sample was matched into equal numbers of males and females in order to potentially account for these differences. Additionally, this variable was examined as a potential covariate as part of Specific Aim 2 but was not found to be a statistically significant predictor of a behavioral health diagnosis.

Due to the nature of the data, there were several variables missing that are important when studying medical and psychosocial outcomes. Information regarding the potential confounding role of health behaviors such as: diet, exercise, and sleep habits, (which have all been shown to influence behavioral health) (Lopresti, Hood, & Drummond, 2013) was not included in this dataset. Related to health behaviors, data regarding body mass index were not collected for this study. Obesity has been shown to be a risk factor for cancer and other diseases (43; 119).

Although the original study methods planned to employ variables regarding race and cancer severity, upon receipt of the data, these variables were either not part of the data set, or in the case of race, missing for the majority of the sample. Race and ethnicity have been demonstrated to be associated with health outcomes in other studies of cancer survivors (21; 57; 110; 119). Despite this, this study was unable to account for or impute data for this variable due to the overwhelming lack of information about study subjects.

Since cancer stage was not included in the data, the 5-year survival rate was employed as a proxy for cancer severity for each cancer. Tumor stage at diagnosis is considered a good prognostic indicator, and is strongly linked to cancer survival rates (13; 14). In the absence of staging data, this substitution was made in order to account for disease severity to study its influence on psychosocial outcomes in cancer survivors.

FUTURE DIRECTIONS

This investigation was an analysis of previously collected data. Given the limitations of using archival data, future studies investigating a population within the Military Health System should strive to use data from both direct care and purchased care medical encounters. Military personnel are given priority within the MHS, often prompting military-affiliated civilian patients to seek care from network providers. Additionally, due to stigma or convenience, military personnel as well occasionally receive care in purchased care settings. Data from these encounters would be a valuable addition to a research study, although it is admittedly difficult to obtain consistent, detailed data from care outside the Military Health System.

The present study had no way to confirm diagnostic precision amongst study subjects and relied on input from providers who come from a variety of specialties. As a result, future studies desiring to examine behavioral health problems in military populations will want to involve standardized methods of assigning behavioral health diagnoses to subjects.

Methods such as standardized diagnostic interviews will ensure accuracy and consistency when classifying emotional distress and behavioral health disorders. A feasible way to implement this procedure would be to utilize psychology interns and extern students to administer a brief diagnostic interview, such as the Mini-International Neuropsychiatric Interview (MINI), to cancer survivors. The MINI is a brief interview lasting 15 to 30 minutes, is able to diagnose a variety of DSM disorders, and possesses sound psychometric properties (122). This process would ensure standardized diagnosis as well as accurate documentation in patients receiving the screening. By screening cancer survivors at regular intervals (perhaps 6- and 12-months post-treatment), this will also afford healthcare providers a method to monitor the psychosocial health of their patients. Using student providers will both lessen the burden on licensed providers as well as ensure that behavioral health diagnoses are reviewed by at least two different parties.

Military personnel were a significant priority in this study given the increase in behavioral health disorders over the last decade. Stigma related to mental health is a serious concern among Service Members and has been demonstrated to influence treatment seeking behaviors. This study was not able to account for nor assess mental health and behavioral health related attitudes or stigma. Including an assessment of these factors in subsequent studies may also lend important insights into the needs of military personnel as well as current barriers to care. This gap may also be addressed by using a standardized assessment. Currently the National Center for Telehealth and Technology (T2) promotes the use of a brief measure of self-stigma called the *Self-Stigma of Seeking Help Scale (SSOSH)* on their post-deployment webpage (134). This measure is a 10-item likert scale questionnaire that addresses respondents' attitudes toward receiving help from a psychologist or therapist. Completion of this questionnaire takes only minutes, and scoring it even less. Including this measure as part of a standard intake packet would afford providers an important insight into the views of their patients as well as a standardized assessment of attitudes toward help seeking behaviors and mental health.

Given the demonstrated influence of many behaviors such as diet and exercise on behavioral health and health-related quality of life, future studies on Active Duty cancer survivors should include data on health behaviors. Overweight and obese individuals are at greater risk of many diseases and have poorer health outcomes (43; 47). Including data on body mass index in future investigations may inform the healthcare community about risk factors or specific needs related to weight and body mass in cancer survivors.

Data on body mass and other health behaviors (e.g., tobacco use, alcohol use, sleep habits, etc.) are routinely collected during healthcare visits. Additionally, there are a variety of health-related programs available to Service Members such as tobacco cessation, alcohol abuse treatment, and physical training programs that could add valuable information on their lifestyle choices. By including questions on intake packets and/or during routine visits such as, "in the last two weeks have you attended any of the following: tobacco cessation programs, alcohol or substance abuse treatment, progressive/remedial physical training and/or weight management training?" researchers will gain access to a wealth of information that can be used to study in conjunction with medical data.

CONCLUSION

As the Military Health System strives to improve cancer survivorship care, current research has identified areas of need for physical health concerns (54); what this study accomplishes is examining potential mental and behavioral health needs of MHS cancer survivors. This study investigated a group of patients that was a rare intersection of two populations at high risk for emotional distress: service members (34; 80; 135) and cancer survivors (88; 136).

Findings demonstrated that emotional distress continues to be a critical domain of cancer survivorship, and is associated with unique patterns of care in cancer survivors with a behavioral health diagnosis. These cancer survivors will need continued screening and follow up for emotional distress as well as access to behavioral health services. As the Military Health System moves toward a patient-centered medical home (70) and integrated care clinics (71; 96), embedding more behavioral health providers in oncology and primary care settings has the potential to improve screening and early initiation of behavioral health care. The finding that risk for emotional disorders increases with time in cancer survivors further emphasizes the need for continual distress screening in primary care of cancer survivors and acknowledges the various stages of cancer survivorship as distinct and important (102). Additionally, the sheer numbers of military personnel who receive behavioral health diagnoses coupled with the distress inherent to cancer survivorship emphasizes the utility and need for the military's resilience training as well as the movement toward a comprehensive biopsychosocial model of cancer survivorship care. This shift toward psychology as a crucial component of healthcare may help to both improve outcomes for cancer survivors as well as lessen the burden on the Military Health System overall.

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Table 1. Distribution of Demographic Data

		n	Percent
Military Status	Active Duty	197	50.0
	Military-Affiliated Civilian	197	50.0
Gender	Male	252	64.0
	Female	142	36.0
Marital Status	Married	300	76.1
	Other than Married	94	23.9
Age	Under 45	184	47.4
	45 or Older	204	52.6
Sponsor Rank	Enlisted	263	66.8
	Officer	131	33.2
Branch of Service	Army	141	35.8
	Navy/Maritime	99	25.1
	Air Force	104	26.4
	Unknown	50	12.7

Note. *Other than Married* includes: single, divorced, and unknown. Navy/Maritime Services includes: Navy, Marines, Coast Guard, and NOAA.

Table 2. Primary Cancer Sites

	n	Percent
Oral Cavity & Pharynx	10	2.5
Brain & Nervous System	10	2.5
Thyroid	50	12.7
Esophagus	2	0.5
Pancreas	4	1.0
Colon	8	2.0
Rectum & Anus	12	3.0
Other GI organs, Peritoneum	6	1.5
Skin Melanomas & Other Non-epithelial Skin Cancer	74	21.8
Breast	54	13.7
Bone & Connective Tissue	6	1.5
Uterus	4	1.0
Cervix	8	2.0
Ovary	8	2.0
Prostate	66	16.8
Testis	16	4.1
Bladder	4	1.0
Kidney/Renal Pelvis/Other Urinary	18	4.6
Hodgkins Disease	3	0.8
Non-Hodgkins Lymphoma	9	2.3
Leukemias	2	0.5

Multiple Myelomas	4	1.0
Ill-defined & Unspecified Primary Cancer	4	1.0

Table 3. Primary Cancer Sites-Collapsed

	n	Percent
Head & Neck	72	18.0
Skin	86	22.0
Genitourinary and Gastrointestinal	118	30.0
Other (Blood, Breast, Bone, Reproductive, Other/Unknown)	118	30.0

Table 4. Length of Cancer Survivorship

	Survival Time from Cancer Diagnosis (months)	Survival Time from End of Treatment (months)
	M (SD)	M (SD)
Total	19.48 (3.12)	17.78 (3.13)

Table 5. Presence/Absence of a Behavioral Health Diagnosis During the Study

		n	Percent
Active Duty	No BH Diagnosis	115	29.2
	Yes BH Diagnosis	82	20.8
Civilian	No BH Diagnosis	116	29.4
	Yes BH Diagnosis	81	20.6
Total	No BH Diagnosis	231	58.6
	Yes BH Diagnosis	163	41.4

Note. No Diagnosis refers to no documented behavioral health diagnosis during the study.

Table 6. Behavioral Health Diagnoses for Active Duty and Military-Affiliated Comparison Group

Diagnosis	Active Duty	Military Affiliated /Non-Active Duty
Adjustment Disorders	23*	6*
Anxiety Disorders	19	10
Attention-Deficit/Conduct Disorders	6*	0*
Cognitive/Delirium/Dementia Disorders	3	1
Developmental Disorders	0	1
Disorders Diagnosed in Infancy/Childhood	2	1
Impulse Control Disorders	0	0
Mood Disorders	29	14
Personality Disorders	1	1
Schizophrenia & Psychotic Disorders	0	1
Alcohol Use Disorders	0	0
Substance-Related Disorders	3	0
Suicide & Intentional Self-Injury	0	1
Miscellaneous Disorders	32	20

Note. * $p \leq .05$. *Miscellaneous Disorders* includes disorders from the following categories: eating; sleep; dissociative; somatoform; psychogenic; sexual and gender identity; and mental disorders due to general medical conditions.

Table 7. Behavioral Health Diagnoses-Collapsed

Behavioral Health Diagnosis	Active Duty	Non-Active Duty	Total
Anxiety and Adjustment Disorders	34*	13	47
Mood Disorders	29*	14	43
Other Disorders	42*	24	66

Note. * $p \leq .05$. *Other Disorders* includes disorders from the following categories: eating; sleep; dissociative; somatoform; psychotic; psychogenic; sexual and gender identity; personality; substance use; cognitive; childhood/developmental; and mental disorders due to general medical conditions.

Table 8. Socio-Demographic & Medical Predictors of Behavioral Health Diagnoses

Predictors	B	S.E.	Exp(B)	CI (95%)
Military status (AD vs Military-Affiliated Civilian)	0.11	0.28	1.12	0.65-1.92
Military rank	-0.04	0.33	0.96	0.51-1.81
Marital status	0.23	0.31	1.26	0.70-2.28
Gender	0.02	0.27	1.02	0.61-1.71
Age	-0.10	0.14	0.91	0.69-1.19
Cancer site	-0.03	0.02	0.97	.094-1.01
Cancer severity (5-year survival rate)	0.01	0.01	1.01	1.00-1.02
Radiation therapy	0.15	0.29	1.17	0.66-2.06
Chemotherapy	0.04	0.36	1.04	0.51-2.12
Length of cancer survivorship	-0.06	0.05	0.94	0.86-1.03

Note. Matching variables were included in the regression.

Table 9. Non-Behavioral Health Encounters in Active Duty Cancer Survivors and Military-Affiliated Civilians

	Mean	Median	SD	B	S.E.	Exp(B)	CI (95%)
Beh. Health Diagnosis	93.43*	73.00	92.91	0.20	0.03	1.37*	1.11-1.70
No Beh. Health Diagnosis	66.75*	55.00	49.90				
Military-Affiliated Civilians	64.93	46.50	59.88	0.30	0.14	1.35*	0.56-0.98
Active Duty	88.06*	65.50	79.13				
Military status*Diagnosis	na	na	na	0.02	0.22	1.02	0.66-1.56

Note. * $p \leq .05$

Table 10. Behavioral Health Treatment: Prescriptions versus Psychotherapy

	B	S.E.	Exp (B)	95% CI
Psychotropic Prescriptions	1.07	0.25	2.92*	1.79-4.77
Psychotherapy	2.01	0.49	7.45*	2.86-19.39

Note. * $p \leq .05$

Table 11. Behavioral Health Treatment: Active Duty versus Military-Affiliated Civilians

	B	S.E.	Exp (B)	95% CI
Military*Psych. Prescriptions	0.15	0.19	1.162	0.80-1.69
Military*Psychotherapy	0.57	0.25	1.765*	1.09-2.86

Note. * $p \leq .05$

Table 12. Behavioral Health Incidence: Time Since Cancer Diagnosis & Military Status

	B	S.E.	Exp (B)	95% CI
Time since termination	0.04	0.01	1.05*	1.03-1.07
Military Status	0.22	0.24	1.27	0.78-2.01
Military Status*Time	0.01	0.02	1.01	-0.03-0.04

Note. * $p \leq .05$

Appendices

APPENDIX A. OPERATIONAL DEFINITIONS

Military Health System:

The *Military Health System (MHS)* is the multi-billion dollar healthcare organization responsible for the medical readiness and care of United States military personnel (Active Duty and retired) and their dependents. The four primary aims of the MHS are: ensuring medical readiness for Active Duty personnel; promoting population health; providing a high quality experience of care; and providing cost-effective healthcare. Examples of some of the components of the MHS are: the medical departments from each military branch (e.g. Army/AMEDD, Navy/BUMED); TRICARE and TRICARE Management Activity; and the Uniformed Services University of the Health Sciences.

TRICARE

TRICARE is the military's managed healthcare organization. It was established in the mid 1990's to organize and enhance healthcare delivery for military personnel worldwide. TRICARE is responsible for coordinating healthcare services between military hospitals and clinics and civilian medical care resources (including hospitals, pharmacies, and individual providers).

Cancer survivor:

While there are numerous formal definitions of *cancer survivor* (58), for the purposes of the proposed project a *cancer survivor* will be considered as a cancer patient who has completed primary anti-cancer treatment (23; 50; 82).

Health:

For the purposes of this doctoral research proposal, the following definition of health will be employed: *health* is not solely the absence of illness or disease; rather, it denotes a comprehensive state of wellbeing to include: physical, mental, and interpersonal functioning (2). The *subjective perception of wellbeing*, both physically and mentally, is also a vital component of health (125).

Quality of life:

The Centers for Disease Control and Prevention defines *Quality of Life* as an individual's self-determined metric of their overall wellbeing that includes subjective perception of both negative and positive components of life (7).

Health-related quality of life:

Health-related quality of life (HRQOL) refers specifically to an individual's perception of physical and mental health, and its influence on overall wellbeing (7). This construct is important to the proposed study as chronic and debilitating conditions such as cancer and depression often have broad reaching, negative effects on HRQOL (38; 141).

Chronic disease and chronic illness:

This doctoral research proposal uses the following definitions of chronic disease and chronic illness as defined by Martin (94).

> *"Chronic disease* is defined on the basis of the biomedical disease classification…that also implies an expected long duration and lack of cure...[this definition includes] both non-communicable diseases, such as diabetes, heart disease,…cancer, and depression, and communicable diseases, such as AIDS" (Martin, 2007, p. 2086).

> *"Chronic illness* refers to the lived experience of long-term bodily or health disturbance, whether related to a communicable or non-communicable disease, condition, syndrome, or disorder; and how people live and cope with the disruption. It is 'experience of intrusive bodily or mental unwelcome unpleasant sensations' and includes phenomena such as fatigue, weakness, anomie, confusion, or social stigma" (Martin, 2007, p. 2086).

Mental health:

According to the World Health Organization**,** *mental health* is not only the absence of illness, but is also a state in which a person can effectively cope with psychosocial stressors, appreciate their own inner strengths and resources, and make a positive contribution to their psychosocial environment (3). In 2000 it was estimated that only about 17% of U.S. adults would be considered to be in a state of optimal mental health (56). A more recent study of a nationally-representative sample found that the lifetime risk for any DSM-IV mood, anxiety, substance abuse, or impulse-control disorder was 46.4% (79). There is emerging evidence that positive mental health is associated with improved health outcomes (6; 36).

Mental illness:

Mental illness is defined as any diagnosable mental disorder or health condition involving alterations in mood, cognitive function, or behavior, which results in distress and/or impedes functioning (56). According to Kessler et al., more than 26% of the U.S. adult population experience depressive symptoms (81). Murray and colleagues (1996) estimate that by 2020 depression will be second only to ischemic heart disease as the leading cause of disability worldwide (104).

Behavioral health:

In this doctoral research proposal, the term *behavioral health* is regarded as synonymous with *mental health.* In 2009 the Army Health Promotion, Risk Reduction, and Suicide Prevention Campaign was launched in part to investigate ways to reduce the Army's steadily increasing suicide rate. One aspect of this campaign was focused on reducing the stigma associated with mental health services. As a result, a directive was issued which stipulated that the term *behavioral health* was to replace *mental health* within the Army community (4; 5; 9).

Depression:

In research and in practice the term *depression* has been used loosely to describe conditions ranging from normal reactions to stressful situations to Major Depressive Episodes. In this proposal *depression* is employed as an inclusive term encompassing DSM-IV Depressive Disorders, as well as generic labels of "depression" used in research publications and medical documentation.

Depression is currently the leading mental health cause of disability and disease burden worldwide, and the third leading cause of disability and disease burden overall (111). According to the Centers for Disease Control and Prevention (CDC), depression is projected to be the second leading cause of disability by 2020, surpassed only by ischemic heart disease (114).

Distress:

> *Distress* is defined by the National Comprehensive Cancer Network (NCCN) as "a multifactorial unpleasant emotional experience of a psychological (cognitive, behavioral, emotional), social, and/or spiritual nature that may interfere with the ability to cope effectively with cancer, its physical symptoms and its treatment" (106).
>
> "Distress extends along a continuum, ranging from common normal feelings of vulnerability, sadness, and fears, to problems that can become disabling, such as depression, anxiety, panic, social isolation, and existential and spiritual crisis" (pg. 208) (69; 106).

It is estimated that 10 to 50% of cancer survivors experience significantly high levels of distress (97), and that this phenomenon is greatly under-recognized by medical professionals (69).

Person-time

Person-time is an incidence rate statistic. It is a measure of individuals diagnosed with a condition in comparison to the total number of individuals at risk for developing said condition over a certain period of time. This statistic is frequently expressed in terms of person-years, but can be tailored to the demands of a particular study (e.g. person-months, person-days, etc.) (73).