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Predictors of Depression Screening Among Cancer Patients in U.S. Ambulatory Settings

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Walden University
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Abstract

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MPH, Johns Hopkins School of Public Health, 2010

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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Abstract

Depression is a common mental health comorbidity in cancer diagnoses, affecting 8-24% of cancer patients. Despite the high prevalence of depression among cancer patients, it is often unrecognized and untreated, thereby representing an enormous psychological distress source among the cancer patient population. The purpose of this study was to explore and establish the factors that predict depression screening among cancer patients in the ambulatory care setting in the United States. The health belief model guided the study. Secondary data from the National Ambulatory Medical Care Survey were analyzed to evaluate the predictors of depression screening in patients diagnosed with cancer. The logistic regression model was used to analyze the data and test whether the independent variables predicted depression screening among cancer patients. The study result showed a low depression screening rate of 3.8% among cancer patients. Patient age, physician specialty, and geographic region of the physician visit were found to be statistically significant predictors of receipt of depression screening among cancer patients attending ambulatory care settings. However, when all of the independent variables were controlled for in the logistic model, the gender variable was no longer a statistically significant predictor of depression screening, thereby indicating a potential confounding effect. Overall, the current study may contribute positively to society by stimulating new approaches to recognizing and managing patients with comorbid conditions and informing public debates, policy-making strategies, and screening guidelines.

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Dedication

I dedicate this dissertation to my best friend, helper, and soul-mate, my wife, Oluwakemi Stephanie Fawole, for helping me to get to the finish line.

I dedicate this dissertation to my lovely children, Jesse, Joys, and Tunmise, who demonstrated deep understanding and maturity all through my program.

I dedicate this dissertation to my late parents, Hon. Justice Jones Oyesomi and Esther Omolara Fawole, who taught me that education was the best legacy they can give me.

I dedicate this dissertation to my late brothers, Prof Bukola Fawole, who helped guide my choice of specialization in medicine, and Gbenga Fawole, my "learned" brother, who always told me, "all will be well."

I dedicate this dissertation to all my siblings: Toye Fawole, for your kind nature; Dele Airen, for your constant prayers; and Leye Fawole, for always making me believe in myself.

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"Bless the Lord, O my soul: and all that is within me, bless His Holy name … and forget not all of His benefits." I acknowledge the empowering grace of God, which He bestowed on me as I journeyed through the dissertation process. He gave me the gift of great people who helped me in unspeakable ways all the way.

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Chapter 1: Introduction to the Study

Background

Cancer continues to be one of the leading causes of death in the United States, second only to cardiovascular disease (D'Souza et al., 2019). Comorbidity with cancer is associated with increased cancer-specific mortality and other causes of mortality (Pule et al., 2019). Specifically, there is abundant evidence that for cancer patients, an additional diagnosis of mental illness, including depression, reduces survivability (Koroukian & Sajatovic, 2017; Zhu et al., 2017). In addition to the excess cancer mortality seen in people with depression, cancer, and depression, comorbidity prevalence also continues to increase (Krebber et al., 2014). The literature shows considerable variation in prevalence estimates of comorbid depression and cancer. Such estimates are partly dependent on the methodology used to define depression and the population (Michael, 2007). Walker and colleagues used strict eligibility criteria in selecting articles to address the limitations of previous reviews and explore the prevalence of depression in adults with cancer. The authors reported a prevalence of 5-16% in outpatients, 4-14% in inpatients, 4-11% in mixed outpatient and inpatient samples, and 7-49% in palliative care (Walker et al., 2013). Other authors have reported similar estimates (Wagner et al., 2017). However, still other authors have reported higher prevalence rates, such as 21.5% in a Taiwanese cancer inpatient population (Tu et al., 2014) and 56.5% in a Czechoslovakian population (Světláková et al., 2019).

Some authors have estimated the prevalence of depression by cancer type. For example, Margari et al. (2016) investigated depression and anxiety among lung cancer

patients. The prevalence of depression in Margari et al.'s sample was 21.8%, and the prevalence of anxiety was 17.9%. The authors demonstrated a statistically significant correlation between depression and hospitalization, with hospitalized patients exhibiting almost twice the severe depression rates compared to those not hospitalized. Wondimagegnehu et al. (2019) conducted a cross-sectional study of 428 breast cancer patients and reported that 1 in every 4 patients had depression.

Early detection and prompt treatment of depression symptoms among cancer patients can reduce patients' suffering, prevent progression to a major depressive disorder, and improve treatment compliance (Howell et al., 2011). Although more favorable outcomes have been documented when depression is treated, cases may go unrecognized and untreated (Abid et al., 2018). There have been several calls to proactively and systematically screen for depression in cancer patients (McNiff et al., 2008; Riba et al., 2019; Wagner et al., 2013). Several screening tools for depression have been developed, some of which have been validated for use in oncology. While screening tools used to measure depression in patients with physical illness have generally not demonstrated superior clinical use compared to traditional clinical interviews and mental status examination, screening instruments can nevertheless be useful in identifying patients in need of further assessment (PDQ Supportive and Palliative Care Editorial Board, 2019). Screening instruments commonly used for this purpose include the Hospital Anxiety and Depression Scale (HADS), the nine-item Patient Health Questionnaire (PHQ-9), and the Distress Thermometer (Love et al., 2002; Spitzer et al., 1999).

Identifying the potential predictors of and risk factors for the development of depression in cancer patients could facilitate the prompt identification of patients at risk for depression. Several authors have explored such predictors. For example, Wen et al. (2019) conducted a systematic literature review to identify the risk factors for depression in cancer patients undergoing chemotherapy. Social support, anxiety, perceived stress, and self-efficacy were factors that were consistently associated with depression in cancer patients. Gender has also been shown to be a variable with a potential effect on the diagnosis of depression. Lima et al. (2016) explored the predictor variables for depression in 400 adult cancer outpatients attending a specialized cancer hospital. Male gender was the only protective factor found against the development of depressive disorder. Female gender was found to be a risk factor for both depression and anxiety disorder. Other factors explored included previous psychiatric history and marital status, which were risk factors for developing an anxiety disorder.

Although studies have identified predictors of depression screening among the general adult population and adult population with chronic disease, no studies have systematically explored predictors of depression screening among cancer patients. For example, Bhattacharjee et al. (2018) examined national patterns of predictors and trends in depression screening among adults without depression in the United States. The predictors examined included year, gender, physician specialty, geographic region, and time spent with the physician. The national-level depression screening rate was reported as 1.4% of all adults studied, and the predictors examined were significantly associated with depression screening.

There is a tendency for patients with chronic physical conditions such as cancer to use mental health services less than those without such conditions. Jolles and colleagues (2015) studied whether the presence of chronic physical conditions was associated with mental health service use for individuals with depression who visited a primary care physician and whether race modified the relationship. Patients who reported at least one chronic condition were found to have a 6% decrease in the probability of using a mental health service. Race or ethnicity did not contribute to any differences seen in service use. Considering the relatively high prevalence of depression among cancer patients and the high rate of depression underdiagnosis and treatment, gaining insight into issues surrounding screening and cues for identifying depression has public health significance. Indeed, recognizing the predictors of depression screening in patients diagnosed with cancer can expedite early and prompt diagnosis with the potential for prompt treatment. Ultimately, this can improve cancer-related outcomes, including quality of life and survivability (Koroukian & Sajatovic, 2017).

Problem Statement

Cancer continues to be a leading cause of death in the United States. For example, over half a million cancer deaths were expected in the United States in 2020 (American Cancer Society, 2020). Despite new and innovative interventions to curb high cancer mortality, fatal outcomes are still prevalent. The comorbidity of cancer with chronic health conditions is common and has been widely studied and shown to contribute to the increased mortality seen among cancer patients (Park et al., 2017). Depression represents one of the most frequent mental disorders that occurs comorbidly with cancer (Smith,

2015). Poorer cancer outcomes, including increased cancer mortality, are associated with comorbid mental illness (Zhu et al., 2017). With a comorbidity of depression, cancer mortality drastically increases (Musuuza et al., 2013). In a cohort study of 244,261 adult patients diagnosed with primary cancer, patients with a first-onset mental disorder, including mood disorders, were at increased risk of cancer-specific mortality (Zhu et al., 2017). Therefore, while a cancer diagnosis represents a grave medical condition, comorbidity with depression presents an additional burden, making it an even more significant public health issue. Depression is associated with a higher level of stress-related biomarkers (Strawbridge et al., 2017). Similar chemical imbalances have been proposed to be a mediating factor in cancer's widespread inflammatory processes (Koroukian & Sajatovic, 2017). Therefore, adequate treatment of depression comorbidly occurring with cancer may reduce the inflammatory processes seen in cancer pathophysiology, potentially impacting the rate of cancer remission, cure, and mortality outcomes.

Early diagnosis and prompt treatment of depression in cancer are associated with better cancer outcomes. However, most cases of depression in cancer patients are missed by medical professionals for several reasons, including inadequate physician training, increased patient load, and limited time to examine patients' emotional function holistically (Popoola & Adewuya, 2012). The adoption of simple screening instruments has repeatedly demonstrated effectiveness in identifying depressive symptoms among the cancer patient population. Identifying predictors or determinants of depression screening can potentially help healthcare providers navigate the process of screening for depression

among cancer patients (Harrison et al., 2010). However, there is currently no study that has explored the predictors of depression screening among cancer patients. Therefore, there is a need for research to examine such potential relationships.

Previous studies have explored national-level predictors of and trends in depression screening among adult populations with or without a depression diagnosis in ambulatory care settings (Bhattacharjee et al., 2018; Harrison et al., 2010; Schmitt et al., 2010). However, no study has examined the predictors of depression screening among patients who are diagnosed with cancer. Therefore, this study's objective was to determine the predictors of depression screening among patients with cancer.

Purpose of Study

The purpose of this research was to determine and evaluate the predictors of depression screening among cancer patients in ambulatory care settings in the United States. Therefore, the study explored the factors that predict depression screening for cancer patients in ambulatory settings. Sociodemographic factors, such as age, gender, and race, as well as other variables such as physician specialty, time spent with the physician, and consultation with a mental health provider, were explored as potential predictor variables in this study. The outcome variable was depression screening (yes/no). A quantitative approach was used to determine if there were any relationships between the independent and dependent variables.

Research Questions and Hypotheses

RQ1. Is there an association between consultation with a mental health provider and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between consultation with a mental health provider and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between consultation with a mental health provider and screening for depression among patients with a diagnosis of cancer.

RQ2. Is there an association between time spent with the physician and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between time spent with the physician and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between time spent with the physician and screening for depression among patients with a diagnosis of cancer.

RQ3. Is there an association between gender and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between gender and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between gender and screening for depression among patients with a diagnosis of cancer.

RQ4. Is there an association between age and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between age and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between age and screening for depression among patients with a diagnosis of cancer.

RQ5. Is there an association between race and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between race and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between race and screening for depression among patients with a diagnosis of cancer.

RQ6. Is there an association between physician specialty and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between physician specialty and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association

between physician specialty and screening for depression among patients with a diagnosis of cancer.

Theoretical Framework

Theories powerfully influence how evidence is collected, analyzed, understood, and used, making it practical and scientific to explore theories and make them foundational in research development (Alderson, 1998). A useful framework for this dissertation was the health belief model (HBM). The HBM posits that "messages will achieve optimal behavior change if they successfully target perceived barriers, benefits, self-efficacy, and threat" (Jones et al., 2014, p. 566). The key constructs of the HBM include risk susceptibility, risk severity, benefits to action, barriers to action, self-efficacy, and cues to action (Becker, 1974; Champion & Skinner, 2008).

Knowing the predictors of depression screening among patients with a diagnosis of cancer can empower patients, practitioners, and stakeholders to begin seeing risks and thereby potentially stimulate behavioral changes. Such behavioral changes may include cancer patients seeking mental health consultations even before they are diagnosed with a mental condition such as depression. Physicians who take care of cancer patients can learn to recognize cues that prompt them to initiate depression screening discussions. This idea aligns very well with the concept of value-expectancy, which posits that behavior can be understood when the value that an individual places on a particular outcome is known as the likelihood (i.e., expectation) that the action will result in the desired outcome (Gipson & King, 2012).

This study determined whether there was an association between screening for

depression, the dependent variable, and the independent variables of age, gender, race, physician specialty, consultation with a mental health provider, and time spent with physicians among adults with a cancer diagnosis. A perceived risk severity and risk susceptibility (of a negative cancer outcome complicated by the co-occurrence of depression) could motivate patients and their providers to recommend early screening for depression. Chapter 2 outlines the historical perspective and operationalization of the key concepts of the HBM.

Based on the HBM, consulting with a mental health provider contributes to risk perception (perceived susceptibility) for developing depression (Choudhry et al., 2016). Additionally, spending more time with physicians helps one understand the depth of the risk (perceived severity) of the various physical, psychological, social, and economic complications of depression (Bhattacharjee et al., 2018; Wen et al., 2019). Sociodemographic factors such as gender and age can influence the belief that depression screening is useful and applicable (perceived benefits) for individuals diagnosed with cancer (Bhattacharjee et al., 2018; Wen et al., 2019). There is evidence that race may prevent individuals (perceived barriers) from ultimately taking preventive action, including undergoing depression screening (Hansotte et al., 2017; Wen et al., 2019). The physician's specialty is an external trigger (cues to action) that may increase the possibility of getting screened for depression (Bhattacharjee et al., 2018; Wen et al., 2019). Given this study's objective, which was to determine and evaluate the factors that can influence screening for depression in ambulatory settings for adults with a cancer diagnosis, the HBM was an appropriate theoretical framework for this study.

Nature of the Study

This study was quantitative and used a cross-sectional design. The study's goal was to determine the predictors of depression screening among cancer patients in ambulatory settings. Secondary data from the National Ambulatory Medical Care Survey (NAMCS), which comprises a national probability sample of visits to the emergency and outpatient departments of noninstitutional general and short-stay hospitals, were analyzed. The NAMCS data were designed to meet the need for objective, reliable information about the provision and use of ambulatory medical care services in the United States. The database is open to the public and easily accessed by going to a website. The data were collected using surveys that captured physician-patient encounters or clinic visits. These encounters could have involved direct or personal interactions between patients and their physicians or clinic staff working under the direct supervision of a physician. A multistage probability sampling design was employed to collect the NAMCS data (National Center for Health Statistics [NCHS], 2015). This involved probability samples of primary sampling units (PSUs), physician practices within PSUs, and patient visits within practices. The second stage involved a probability sample of practicing physicians, and the final stage was the selection of patient visits within the annual practices of sample physicians.

The logistic regression model was used to analyze the data and test whether the independent variables predicted the dependent variable. Logistic regression is ideal for testing models when there is one nominal and two or more measurement variables (Pallant, 2010). As a statistical model, the logistic regression describes the relationship

between an independent variable and a binary dependent variable. The independent variables could be one or more nominal, ordinal, or interval level independent variables (Nick & Campbell, 2007). Therefore, the one dependent variable that I used in the study was dichotomized, and the use of logistic regression was justified.

Definitions

A concise definition for each of the independent and dependent variables as used in this study is provided below:

Depression: A mood disorder characterized by an experience of persistent feelings of sadness, hopelessness, and loss of interest. Depression, as used in the study, includes both symptoms of depression and any of the five classifications of a depressive disorder by the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5; American Psychiatric Association, 2013).

Screening: "Screening for diseases is the examination of asymptomatic people to classify them as likely or unlikely to have the disease that is the object of screening. People who appear likely to have a disease are investigated further to arrive at a final diagnosis. Those people who are found to have the disease are then treated" (Morrison, 1992, p. 3).

Depression screening: The use of validated and nonvalidated instruments to identify asymptomatic people to classify them as likely or unlikely to have depression.

Mental health provider: This refers to psychologists, counselors, social workers, and therapists who provide mental health counseling, including psychiatrists.

Cancer: A disease whereby a single normal body cell undergoes a genetic or

metabolic transformation characterized by an uncontrolled division of abnormal cells in a part of the body. The term is used with any body site.

Time spent with a physician: The amount of time (in minutes) that a physician spends with a patient, not including time that the patient spends waiting for an appointment or with another type of practitioner (NCHS, 2007).

Assumptions

In this study, I attempted to identify the predictor variables for depression screening among cancer patients using secondary data collected by the NAMCS. The data consisted of surveys administered to patient populations in the ambulatory care setting across the United States. One of the assumptions for this study was that the respondents answered the survey questions as truthfully as possible. The NAMCS used surveys to obtain data about physicians' services rendered to ambulatory patients during office visits. The questions asked were not sensitive, and therefore there were no expectations that the responses were laced with falsehood. Information collected from the surveys included service delivery, prescribed medication, patient characteristics, physician characteristics, and diagnoses.

Scope and Delimitations

The study may influence the approach taken in screening cancer patients for a comorbid diagnosis of depression. Comorbid depression can lead to a poorer cancer outcome, especially when the depression is not identified and treated (Zhu et al., 2017). Prompt identification and subsequent treatment lead to an improved patient experience (PDQ Supportive and Palliative Care Editorial Board, 2019). The study's scope included

physician-patient encounters or visits focusing on patients with a cancer diagnosis irrespective of the cancer site who were screened for depression in the ambulatory care setting in the United States. The sampling design used to collect data was multistage probability sampling, which involved taking samples in stages using smaller and smaller sampling at each stage.

The study was limited to physician-patient interactions occurring in the ambulatory care setting. As such, only variables related to physician-patient interactions were explored as independent variables. The results from this study create a foundation for exploring other predictors of depression screening among cancer patients.

Limitations

The potential limitations of this study should be noted. First, the data used in the analysis were cross-sectional, which did not allow for inferences regarding causation. Additionally, a potential limitation that may be related to using existing data from a large national database is study-specific nuances or glitches occurring during the data collection process, which may be important to the interpretation of some specific variables but may not be immediately obvious (Cheng & Phillips, 2014). Other limitations included those related to the collected variables, including lack of information on specific cancer types/sites.

Significance

Research is increasingly being evaluated by its significance and essential contributions to society and not just on its scientific impact (Bornmann, 2012). A dissertation topic focusing on establishing the factors associated with screening for

depression among patients with a cancer diagnosis can have a long-lasting positive effect on the population. As noted in the preceding section, cancer complicated by depression has important outcomes related to poor quality of life, increased cost of treatment, and higher morbidity and mortality. Therefore, this study determined the factors that predict which cancer patients will get a depression screening in the ambulatory setting. The study may contribute to society by stimulating new approaches to managing patients with comorbid conditions and informing public debates and policy-making strategies necessary to promote social change.

Summary

Depression occurring comorbidly with cancer continues to represent a significant public health problem. The burden on affected patients and their caregivers cannot be overemphasized. Improved depression diagnostic efforts followed by prompt treatment will go a long way toward alleviating the excess burden arising from the comorbidity. Gaining a deep understanding of how patients get screened for depression and the predictors for such screening should be one of the first steps in improving outcomes in patients with comorbid cancer and depression.

In this chapter, I presented an introduction and background for the study's topic, including a summary of the literature. I emphasized the study's public health significance and the problem associated with cancer and depression comorbidity and lack of adequate screening for depression among the patient population. I summarized the methodology that I used, including the study population and collection of secondary data. Additionally, I highlighted how the theoretical framework relates to each of the variables used in

defining the research questions. Finally, I discussed the study scope, delimitations, limitations, and anticipated assumptions.

Chapter 2 will contain an extensive review of the literature covering the prevalence of depression and cancer, the interaction between depression and cancer, predictors of depression in cancer patients, determinants of depression screening among cancer patients, and access to depression screening. Importantly, the literature search strategy will be outlined. A historical account of the theoretical framework used will be discussed. Additionally, I will describe how the theory relates to the study, and how it will be appropriately integrated for application and use in the study. In Chapter 3, I will discuss the research methodology, which will be followed by the presentation of the study results in Chapter 4. I will conclude with Chapter 5, which will include a discussion, recommendations, a summary, and a conclusion.

Chapter 2: Literature Review

Introduction

Depression occurs commonly among cancer patients, with some studies showing a pooled mean prevalence ranging from 8-24% (Krebber et al., 2014). Despite the high prevalence of depression among cancer patients, it is often unrecognized and untreated, thereby representing an enormous psychological distress source among the cancer patient population (Abid et al., 2018). Comorbid depression is associated with poorer cancer outcomes (Alemayehu et al., 2018; Smith, 2015). For example, the presence of comorbid depression significantly worsens the quality of life of cancer patients (Larkin, 2020). Compared with nondepressed cancer patients, depressed patients are more likely to have cancer that progresses and is invasive (Lin et al., 2018; Smith, 2015). Poor compliance with medical therapy and poor cancer survivability have also been identified as common outcomes of the co-occurrence of depression and cancer (Pasquini, & Biondi, 2007).

While routine screening for depression has been recommended and endorsed both locally and internationally as an effective measure, the uptake of routine screening for depression among patients with cancer and other chronic disease conditions is not optimal (PDQ Supportive and Palliative Care Editorial Board, 2019). Existing published research has addressed the predictors, patterns, and trends of depression screening among adult populations with and without depression in the ambulatory care setting (Bhattacharjee et al., 2018; Harrison et al., 2010). However, there are currently no published studies investigating depression screening among cancer patients, including potential determinants and predictors of screening among this population in the

ambulatory care environment.

The ambulatory care setting represents one of the most frequent contact points where patients with comorbidities meet with healthcare professionals (Carrera-Lasfuentes et al., 2015). Combined data analysis of the 2001 and 2002 NAMCS and National Hospital Ambulatory Medical Care Surveys (NHAMCS) found an average estimate of 1.1 billion visits per year to physician offices, hospital outpatient departments, and emergency departments. This is an equivalent of 3.8 visits per person annually (Schappert & Burt, 2006). Despite the large volume of patient flow in ambulatory care settings, there is evidence of relatively good care coordination for patients visiting different specialists (Valderas et al., 2009). Comorbidity is related to the rate of utilization of ambulatory medical care (van den Bussche et al., 2011). This study determined the predictors of depression screening among cancer patients attending ambulatory care settings in the United States.

The chapter will extensively review the literature relevant to screening for depression among patients diagnosed with cancer and the various predictors of depression screening in the patient population. The chapter will start with an outline of the HBM, the theoretical framework for this study. Specifically, I will review the prevalence of depression and cancer, the interaction between depression and cancer, predictors of depression in cancer patients, potential determinants of depression screening among cancer patients and/or patients with other chronic diseases, barriers, access to depression screening, screening, the prevalence of depression screening, and depression screening recommendations and patient outcomes.

Literature Search Strategy

The databases searched included Medline/PubMed, Ovid, Embase, CINAHL, and PsycINFO. I also explored the Walden University Library and Google/Google Scholar search engines. In searching these electronic databases, I used specific search terms, including *depression screening (screening and depression) AND cancer patients*. The same combination of search terms was entered into all the databases. Reference lists of included articles were equally examined to identify further journal articles that might have been missed. Limits were placed in some of the databases to concentrate on relevant articles. Such limits included *the English language, human*, and *articles published within the past 5 years*. The article abstracts were exported to an Excel spreadsheet, and the articles were subsequently scanned to enable the removal of articles that appeared obviously out of scope. Articles that were the most pertinent were reviewed. While the searches were generally limited to 5 years (2015–2020), some research articles used to review the theoretical framework were older than 5 years. Some of these articles consisted of seminal articles to give the necessary historical account of the chosen theory as well as to establish the contextual facts and how the theory had evolved over the years.

Theoretical Framework

The HBM is one of the most extensively used health behavior theories (Glanz & Bishop, 2010). The model was originally formulated in the United States in the 1950s by social scientists working to explore the reason why people refuse to adopt preventive health behavior, including screening that can detect disease in the early phase (Rosenstock, 1974). The central tenet of the HBM was significantly influenced by the

theories of Kurt Lewin. The early social psychologists working on the theory of the HBM built most of their work on his theory.

The HBM was originally conceptualized to include constructs relating to perceived susceptibility, perceived severity, as well as perceived benefits and perceived barriers (Rosenstock, 1974). Perceived susceptibility and perceived severity are indicative of a disease state, while perceived benefits and perceived barriers refer to the behavioral action that must be adopted by the individual to avoid or reduce the risk of a disease condition.

Rosenstock (1974) described three different ways that individuals may internalize the construct of perceived susceptibility. Some individuals may not believe that they are susceptible to a disease. Other individuals may recognize the scientific possibility of a disease occurring but believe that they are unlikely to be affected by it. Finally, some individuals may acknowledge the presence of the real possibility of becoming affected by the disease.

Perceived severity refers to the degree to which individuals believe that they can be negatively affected by a disease (Orji et al., 2012). Perceived benefits refer to adopting a health behavior based on the perceived advantages that an individual believes that the new behavior could lead to, in terms of subjective reduction of susceptibility to or severity of disease (Jones et al., 2015). Perceived barriers indicate the various negative actions or attributes associated with making a health behavior change (Jones et al., 2015). Perceived barriers could be unpleasantness and inconvenience associated with the steps necessary for the behavioral change, or barriers related to the financial cost of the desired

behavior change. All of these components work in concert to influence whether an individual acts or not.

Approximately 20 years after the initial construct of the HBM was introduced, as more prospective studies were designed, the construct of self-efficacy was added to the HBM (Boslaugh, 2013). Self-efficacy is a concept that was originally developed by Albert Bandura, a social psychologist (Bandura, 1977). The concept refers to the confidence that people have about their ability to perform a behavior. An additional variable called *cues to action* was introduced, which was considered to be necessary to complete the model at the time. As individuals begin to consider making appropriate behavioral changes, the combination of susceptibility and severity in concert with the perception of benefits or fewer barriers may not be enough to stimulate the action required. A trigger, or a cue, appears to be necessary to complete the behavioral change cycle. Based on Rosenstock's original description, cues to action could be internal cues by which an individual could perceive a change in bodily state or external cues such as interpersonal interactions. Cues to action could represent any factors that can instigate health behavior change or prompt an individual to take a health-related action. Over time, other modifying variables, such as social, psychological, and demographic factors that play important roles in individuals' decisions to take action, were added to the HBM.

Jones et al. (2015) described three basic models related to variable ordering that could be relevant to the operationalization of the HBM. In the first model (parallel mediation), the independent variables (e.g., gender and age) influence the HBM constructs, which in turn influence the dependent variable (e.g., screening for

depression). The model conceptualizes the HBM constructs as channels of influence, where the independent variables are seen as influencing outcome variables through one or more of the channels. The authors also described a second model in which each construct of the HBM connects in a causal chain. In the third model (moderated mediation model), individual constructs that form the HBM may serve as moderators for the other constructs to exert their influence toward stimulating a behavior change. For example, in order for a potentially predicted behavior to occur in the light of perceived benefits and perceived barriers, the perception of threat needs to be greater. In this example, the perception of threat moderates the effect or influence of both perceived benefits and perceived barriers on the specific behavior change (Champion & Skinner, 2008).

The present study determined whether there is an association between screening for depression, the dependent variable, and the independent variables of age, gender, race, physician specialty, consultation with a mental health provider, and time spent with physicians among adults with a cancer diagnosis. Based on the HBM, a cancer patient who consults with a mental health provider contributes to risk perception (perceived susceptibility) for developing depression (Choudhry et al., 2016). Additionally, spending more time with physicians helps one to understand the depth of the risk (perceived severity) of the various physical, psychological, social, and economic complications of depression (Bhattacharjee et al., 2018; Wen et al., 2019). The tendency to discuss other related health issues outside of the primary cancer diagnosis is likely to occur as a function of how much time a patient and doctor spend together in consultation. Sociodemographic factors such as gender and age can influence the belief that depression

screening is useful and applicable (perceived benefits) for individuals diagnosed with cancer (Bhattacharjee et al., 2018; Wen et al., 2019). There is evidence that race may prevent individuals (perceived barriers) from ultimately taking preventive action, including undergoing depression screening (Hansotte et al., 2017; Wen et al., 2019). The specialty of the physician is an external trigger (cues to action) that activates discussion between patients and their physicians, and the possibility of getting screened for depression (Bhattacharjee et al., 2018; Wen et al., 2019).

Specialists, including oncologists, pediatricians, and psychiatrists, are the health care providers with the most frequent contact with patients with potential comorbid depression and cancer in the ambulatory care setting and can potentially play vital roles in the detection of depression among the cancer patient population (Agapidaki et al., 2013). Despite the pivotal position that these health care professionals occupy, the underrecognition and undertreatment of depression cannot be overemphasized. The literature has identified some specific health-care-provider-related barriers to screening for depression. These include attitudinal predisposition (Heneghan et al., 2007), inadequate dedicated time resources, increased workload, and poor communication between cross-functional team members (Horwitz et al., 2007). Few authors have used the HBM to explore the interaction of factors among health care providers that may predict or serve as barriers for depression screening among their patients. Agapidaki et al. (2013) examined the impact of an HBM-based educational intervention on pediatricians for the purpose of improving early identification and management of depression among mothers. The authors assessed the pediatricians' knowledge, self-efficacy, and attitudes

concerning maternal depression at baseline and postintervention. They reported that pediatricians in the intervention group demonstrated increased perceived responsibility and increased self-efficacy for detection and referral of maternal depression.

While there is a dearth of literature on the application of HBM constructs to determinants of depression screening among cancer patients, several authors have explored the role of HBM as a theoretical framework to study the predictors of screening for various health conditions. For example, VanDyke et al. (2017) applied the HBM as a determinant of breast cancer screening among 170 women aged 18-78 years in rural Appalachia. The frequency of mammography among respondents was found to be a function of an objective heightened risk and poorer prognosis of breast cancer, which is consistent with HBM expectations. Participants with poor prognosis also perceived greater benefits and fewer barriers to mammography screening. The authors, however, noted that mammogram frequency was not predicted by perceived susceptibility, severity, as well as benefits of mammography, a finding that did not completely fit into the HBM. Similarly, other authors demonstrated that women with lower perceived barriers to screening were more likely to undergo mammography compared to those with higher perceived barriers (Lee et al., 2015). In a prospective study that aimed to identify the predictors of intention to get screened and subsequent attendance at flexible sigmoidoscopy screening using constructs derived from the HBM, a higher score on a scale of benefits was positively associated with intention for screening, while intention was negatively associated with a higher score on perceived barriers. Attendance, however, was predicted by perceived benefits as well as perceived barriers (von Wagner

et al., 2019).

Elias et al. (2017) explored the patterns and determinants of mammography screening among 2,400 Lebanese women ≥ 40 years of age. The association between having ever used and/or repeated mammography and psychosocial and sociodemographic factors was tested. Being older and of higher socioeconomic status (SES) were significantly associated with everuse of mammography. Compared to respondents that were designated "nonrepeaters," "repeaters" were also significantly older. Specific to repetition of mammography, the psychosocial HBM variables that aligned best with the outcome of repeating mammography included higher perceived susceptibility to the disease, ease of access, and higher perceived comfort of the previous mammography encounter.

Literature Review

Prevalence of Depression and Cancer

Depression represents the most common mental health disorder in the general population (Sinyor et al., 2016). According to a recent World Health Organization (WHO) report, approximately 4.4% of the world's population, representing over 300 million people at a global level, are estimated to suffer from depression (WHO, 2017). This represents an increase of 18.4% between 2005 and 2015 (GBD, 2015). The prevalence of depression in the population is difficult to estimate, partly because different researchers use different diagnostic criteria to measure depression. Some structured interview schedules that investigators have used to make an accurate and valid diagnosis and that have helped with prevalence measurement include the Diagnostic Interview

Schedule (DIS), the Schedule for Clinical Assessment in Neuropsychiatry (SCAN), and the Composite International Diagnostic Interview (CIDI; Brugha et al., 2001). A recent meta-analysis reported the aggregate point, 1-year, and lifetime prevalence of depression as 12.9%, 7.2%, and 10.8%, respectively (Lim et al., 2018). There is evidence that rates of depression are approximately twice as high in females compared to males (Baxter et al., 2014; Whiteford et al., 2013). The gender difference was present as early as age 12, peaked during the adolescent years, and first declined but then remained stable in later years (Salk et al., 2017). Depression is the leading cause of disability worldwide and one of the significant contributors to the global burden of disease (Friedrich, 2017). In the United States, depression is a significant cause of decreased workplace productivity, and up to $36.6 billion is lost every year as a result of poor workplace productivity caused by depression (Lépine & Briley, 2011).

Cancer is a chronic disease that constitutes a major public health challenge around the world. In the United States, approximately 40% of men and women will have a diagnosis of cancer at some point in their lifetime (Arem & Loftfield, 2017). The commonest cancers among men include prostate, lung, colon, urinary bladder, and melanoma of the skin, while among females, the commonest cancers include breast, lung, colon, corpus and uterus, and thyroid (Cronin et al., 2018). From 2010 to 2014, the incidence rates of the seven commonest cancers among men and women were reduced (Cronin et al., 2018). Although there was a 29% decline in overall cancer deaths between 1991 and 2017, cancer continues to be one of the leading causes of mortality in the United States (Siegel et al., 2020). In 2020, 606,520 cancer deaths were projected in the

United States (Siegel et al., 2020). Based on data collected from 2001 through 2016/2017 from the Centers for Disease Control and Prevention (CDC), National Cancer Institute (NCI)-funded population-based cancer registries, and the NCHS National Vital Statistics System, cancer death rates decreased on average by 1.5% per year from 2013 to 2017, 1.8% per year among males and 1.4% per year among females (Henley et al., 2020). The burden of cancer continues to increase in the United States and worldwide (Arem et al., 2017). Spending associated with cancer care is high and continues to grow, putting a huge strain on not only the nation, states, and health insurance plans, but also individual family budgets (Yabroff et al., 2019).

There is an abundance of evidence from epidemiological studies that depression commonly occurs comorbidly with cancer (Nikbakhsh et al., 2014). Depression is a chronic disabling disorder that occurs in about 10-25% of cancer patients (PDQ Supportive and Palliative Care Editorial Board, 2019). Studies have demonstrated a 25% mortality rate for cancer patients with comorbid depressive symptoms, and a 39% mortality rate among cancer patients with full-blown major depressive disorders (Mustafa et al., 2013). The gender difference in depression incidence rate among the general population is reversed among cancer patients, as men with cancer report more depression symptoms than women with cancer (Pudrovska, 2010). This is in contrast to the general population, where the incidence of depression in women is almost twice the incidence in men (Baxter et al., 2014). There is evidence that cancer has more adverse psychological effects on men compared to women. Also, male cancer patients reported 1.4 more days per week of symptoms of depression compared to their matched controls without cancer

(Pudrovska, 2010). Cancer affecting the genitourinary system appears to have especially more adverse depressive symptoms among men.

Interaction Between Depression and Cancer

Comorbidity can be described as the co-occurrence of two disorders. As a generalization, a mental illness such as depression can occur with a medical condition such as cancer for three main reasons (Michael, 2007):

1. The two conditions may occur together as a coincidence.
2. The mental disorder or symptoms may have given rise to the medical condition; for example, anorexia nervosa may give rise to serious endocrine consequences that may lead to amenorrhea or severe bone loss.
3. The medical condition, on the other hand, may have given rise to the mental disorder through either the effect of the medical condition and/or its treatment, adverse psychological response to the medical condition and/or its treatment, and/or adverse social response to the medical condition or its treatment.

Depression is a mental illness that often occurs comorbidly with medical conditions such as cancer. In cancer patients, the etiology of depression could be multifactorial, and like the association between other mental illnesses and medical conditions, it could occur coincidentally. However, the association could also be psychosocial or biological (Smith, 2015).

Some patients have depressive symptoms or a diagnosis of depression that predate their cancer diagnosis, while other patients develop depression after being diagnosed with cancer (Michael, 2007). Depression occurs as a result of chemical imbalances in the

brain. It also involves a complex pathology that transcends the neurobiological mechanism to include environmental stressors and genetic vulnerability.

Often, the development of depression among cancer patients could be a psychological reaction to a cancer diagnosis. The symptoms of depression sometimes overlap with psychological reactions to the unpleasant news of a cancer diagnosis as well as some symptoms of cancer, such as poor sleep, pain, and tiredness (Michael, 2007). A cancer diagnosis represents a life-changing experience that a patient needs to negotiate and adapt to. A defective coping style may lead to poor adjustment, which may culminate in depressive symptoms or full-blown major depressive disorders (Chou et al., 2011). Indeed, psychological distress such as depression is well documented among patients diagnosed with life-threatening illnesses such as cancer (Jacobsen & Jim, 2008). The negotiation and the acceptance of a new diagnosis of cancer can be likened to the five stages of dying that were first described by Elisabeth Kubler-Ross, a Swiss psychologist in 1969 (Kübler-Ross, 1969). The stages are a psychological reaction to a severe life event. In the first stage, the patient is typically in denial, and it is not uncommon for him/her to believe there has been a mistake in the diagnosis or the prognosis. This may lead to the second stage, comprised of anger and frustration, especially when the individual realizes that denial cannot continue. The anger stage gives way to the third stage, i.e., bargaining. At the bargaining stage, the patient tries to negotiate to avoid a negative outcome. Commonly, patients may make remarks such as promising never to smoke again if their cancer can be cured (Tyrrell et., 2020). Depression is the fourth stage, and patients express despair and hopelessness. Patients then move on to the last

stage, which is acceptance. People respond to stress in different ways, including the use of coping strategies. The purpose of a coping strategy is to attenuate the effect of stressful events. Still, when the stress saturates the coping strategy or coping style of an individual, the ability to adjust may be impacted, leading to depressive symptoms.

The social effect of having cancer and cancer treatment may facilitate the development of depression. For example, the loss of a job as a result of cancer may act synergistically with the patient's underlying premorbid vulnerabilities, which can precipitate a depressive episode. Evidence of the interaction between social impact and depression in cancer patients was demonstrated by authors who showed that emotional support from family members and friends acts as a protective factor against the development of depression (Linden et al., 2012). Social support impacts both cancer and depression outcomes in patients with comorbid cancer and depression. Some authors have shown that cancer survivability improved significantly among patients with adequate social support, and in addition to the survival benefits , the level of depression and other mental disorders were significantly reduced (Kroenke et al., 2006; Hopko et al., 2015). Additionally, cancer treatment can act as a stressor which in vulnerable patients, and within the right environmental milieu, could lead to depression (Michael, 2007). In terms of biological interaction, some authors have identified uncontrolled pain, metabolic and endocrine abnormalities, as well as concomitant medications as potential medical causes of depressive symptoms in people with cancer (PDQ Supportive and Palliative Care Editorial Board, 2019).

Predictors of Depression in Cancer Patients

Over the past decades, there have been significant advances in cancer treatment. As a result, the number of patients surviving a diagnosis of cancer continues to grow. In the approximately 1.6 million people diagnosed with cancer every year, the relative 5-year survival rate across all cancer types approaches 70-78% (Allemani et al., 2018). As more patients continue to transition into cancer survivorship, it is critical to understand both the short-term and long-term psychosocial adjustment that is part of the disease process. Depression is particularly common among this patient population; hence it is crucial to study the markers, predictors, and trends in depression screening among cancer patients.

Several potential predictors of psychological distress and depression among cancer patients have been identified, including the need to relocate for treatment and being a former smoker (Clinton-McHarg et al., 2014), tumor stage (Tsuguo et al., 2013), psychosocial factors (Godding et al., 1995; Hamilton et al., 2013), and quality of life (Godding et al., 1995). A few researchers have explored the different factors that influence how cancer patients adjust to their cancer diagnosis and how these are associated with the development of psychological symptoms such as depression. Schapmire and Faul (2017) investigated predictors of depressive symptoms over a period of eight years among respondents ages 50 – 91 years. They found that a diagnosis of cancer in patients without aspouse/partner in the home, and cancer diagnosis and lower life expectancy were associated with a higher probability of having a concurrent depression. The authors also identified a significant three-way interaction between

cancer, gender, and social support, in which female cancer patients with poor social support were found to be at a higher risk of developing depression. Other studies did not find a significant relationship between social support and depression among cancer patients. Yoon et al. (2018) examined the relationship between social, cultural, and appraisal factors and depression and quality of life among Korean American population. While the authors demonstrated a statistically significant relationship between higher levels of social support and higher quality of life, they failed to establish a statistically significant relationship between social support and depression. However, they still found that more negative appraisal of illness tended to predict the development of depression among cancer patients (Yoon et al., 2018). However, other authors that have studied a similar population of Korean Americans reported that social support was significantly related to depression in cancer patients (Hae-Ra et al., 2008). The two studies used different social support measures, and the sample characteristics were also different, which may have explained the differences in the two studies. More evidence of social support as a predictor of depression among cancer patients has been reported in other recent literature. Specifically, the absence of a partner was identified as a risk factor for developing depression among patients with gynecological malignancies (Klügel et al., 2017).

Other authors have suggested that the degree of social support a cancer patient receives may not be as important as the ability of cancer patients to receive compassion from others as a predictor of depression symptomatology. For example, Trindade et al. (2018) explored the predictors of depressive symptoms in a sample of patients diagnosed

with breast cancer. Social support and fear of receiving compassion from others were two predictors examined. The authors found that the fear of receiving compassion from others was a significant predictor but not social support.

There is increasing evidence of the relationship between depression and sexual function among cancer patients. For example, in a study of 83 women that were successfully treated for their stage 1b cervical cancer, psychological distress scores were significantly correlated with sexual outcomes, functional outcomes and physical complaints (Cull et al., 1993). The authors reported that the 61 women who admitted to optimal sexual experience prior to treatment all reported a sexual function that was significantly poorer compared to pre-morbid sexual function. Similar trends have been consistently reported in the literature among similar populations (Lau et al., 2013). More recently Klügel et al (2017), conducted a critical review of the literature and identified sexual inactivity as one of the factors that predicts depression among patients diagnosed with cancer.

Age has been shown to be one of the sociodemographic factors that is significantly associated with depression among cancer patients. Wondimagegnehu et al (2019) demonstrated an inverse association between depression andage. Specifically, the authors showed that the risk of having depression decreased by as much as 60-80% as age increased. Patients that were greater than 30 years of age tended to have a lower risk of depression than those 19-20 years of age. Similarly, a study that examined the demographic factors associated with continuous distress in the year following cancer diagnosis reported younger age as a predictor of occasional or continuous distress,

including depressive symptoms in cancer patients (Enns et al., 2013). Vodermaier et al. (2011) also reported that fewer depressive symptoms were observed in older cancer patients.

Determinants of Depression Screening Among Cancer Patients

The purpose of screening for depression among cancer patients seeking treatment is to promptly identify patients with otherwise unrecognized symptoms of depression seeking cancer treatment for subsequent referral to confirm a minor or major depressive disorder and for subsequent treatment (Meijer, et al., 2011). There is a dearth of information on the potential predictors of screening for depression in cancer patients. In addition, few studies have investigated predictors of depression screening among non-cancer study populations. Two studies used pooled data from the National Ambulatory Medial Care Survey (NAMCS), a nationally representative sample. In one of these studies, Bhattacharjee, et al. (2018) examined the predictors of and trends in depression screening among adults without a diagnosis of depression who made an ambulatory care visit to a non-psychiatrist. The authors found that the amount of time spent with the physician, geographical region and metropolitan location, physician specialty, as well as gender of the patient were significantly associated with receipt of depression screening.

Barriers and Access to Depression Screening

The importance of prompt access to screening for mental health and the ability to identify patients in need of both initial and follow-up care cannot be overemphasized. However, there have been extensive studies demonstrating significant disparities in the recognition and treatment of depression. Some of these studies have established that

racial-ethnic inequalities constitute a major problem, with people of minority groups having the least probability of screening for depression (Roberto et al.,2005). A study that evaluated disparities in depression screening and care by gender and race of patients found wide variability by gender, implying the need to consider interactions among patient variables as opposed to exploring screening and mental health utilization based on consideration of a single segment of the population (Hahm et al., 2015).

Barriers to screening for depression are multifactorial and could be classified into those factors relating to the patients and those relating to health care providers. Patient-related factors include the inability to find childcare, problems accessing transportation, and other challenges specific to role responsibilities of women. These factors represent specific barriers to accessing depression care, such as depression screening (Hahm et al., 2015). Patients generally perceive that their providers are prone to neglect their psychosocial needs compared to their physical needs (Adler & Page, 2008). This disparity may be due to a lack of providers of the same racial-ethnic background whom they can trust and not feel stigmatized. Differences in language, barriers related to health literacy, predominant somatic presentation, and use of cultural idioms of distress during presentation to health care providers make under-recognition of depression a notable problem, particularly among minority ethnic groups (Roberto et al., 2005). Making a diagnosis of depression requires skills and a thorough assessment of patients. Greenberg (2004) reported that there is enormous lack of confidence and self-efficacy among clinicians that are not psychiatrist in confidently making a diagnosis of depression among cancer patients, which is usually compounded by the time demand on the health care

provider. Indeed, lack of time has been shown to be the main barrier to the successful screening for distress and other mood-related symptoms, such as depression, among cancer patients (Mitchell et al., 2008). The study also found other factors related to the health care provider, such as sub-optimal training and low confidence, which constitute essential barriers to screening.

Healthcare providers may tend to focus more on physical symptoms co-occurring with cancer than depression and other psychological symptoms. Alison et al. (2016) explored whether there was any difference between screening for physical versus emotional symptoms by the providers of cancer patients. While they found no significant variation, they reported a lower tendency to screen for emotional symptoms, including depression, compared to pain and other types of physical symptoms.

Screening

The conference on Preventive Aspects of Chronic Disease held by the Commission on Chronic Illness in 1951 defined screening as "the presumptive identification of unrecognized disease or defect by the application of tests, examinations, or other procedures which can be applied rapidly. Screening tests sort out apparently well persons who probably have a disease from those who probably do not. A screening test is not intended to be diagnostic. Persons with positive or suspicious findings must be referred to their physicians for diagnosis and necessary treatment" (Commission on Chronic Illness, 1957 Chapter 5, p. 45). The World Health Organization report (WHO) in 1966 further elaborated on the definition of screening and the principle of early detection of disease and scientific aspects of screening procedures. From the initial definition, the

WHO noted that “other procedures” could also potentially embrace the use of questionnaires in screening (World Health Organization, Wilson, & Jungner, 1966). The U.K. National Screening Committee in 2000 further defined screening as “a public health service in which members of a defined population, who do not necessarily perceive they are at risk of or are already affected by, disease or its complications, are asked a question or offered a test to identify those individuals who are more likely to be helped than harmed by further tests or treatment to reduce the risk of disease or its complications” (page 6). The definition of and emphasis on the science of screening have evolved over the years with more focus assigned to the potential side effects arising from the screening procedures and potentially no benefit to the patient being screened. Emphasis has been placed on the need for more rigorous standards of evidence to improve the effectiveness of all screening. Reduction in morbidity and mortality due to the early detection of disease drives the objective of screening tests, especially when a treatment exists for the condition being tested for (Maxim et al., 2014). As part of the appraisal, viability, effectiveness, and appropriateness of a screening program, the National Screening Committee (U.K.) proposed a set of criteria that must be met before screening for a condition is initiated (Kitchener, et al., 2014). These include an emphasis on the condition being screened for (which should be an important health problem), the test (which should be simple, safe, precise, and a validated screening test), the treatment (implying that there should be an effective treatment for all patients identified through early detection with better outcomes compared to late treatment) and finally, the screening program (which should demonstrate effectiveness in reducing mortality or

morbidity).

Prevalence of Depression Screening

Despite the numerous local and international guidelines that have recommended routine screening for depression among medical patients, including cancer patients, depression remains highly unrecognized (Ng, How, & Ng, 2016). While there are not many studies on the prevalence of depression screening among cancer patients, there are few studies that have reported on the prevalence rates of depression screening among the adult population in general (Desai et al., 2006; Farr et al., 2011; Tudiver et al., 2010). Desai et al. (2006) conducted a chart review of the Department of Veterans Affairs (VA) medical outpatients with no history of depression or any mental health visit within the past six months. The authors found that while younger and unmarried patients and patients with more medical comorbidity were more likely to be positive when screened, they were generally less likely to be screened.However, VA facilities that tended to spend more on mental health care were more likely to screen for depression. A similar study that also conducted a chart review of women's records in 19 rural health clinics reported that patients with a history of anxiety as well as younger women had higher probabilities of being screened (Tudiver et al., 2010). In terms of patients' gender, some studies reported no difference in depression screening rates between women and men among patients of all ages (Desai et al., 2006). Harrison, et al. (2010) estimated the probability of screening for depression among U.S. adults using a nationally representative sample and reported a 2.29% prevalence of depression screeningduring community-based physician practice visits. Other authors reported a lower nationallevel depression screening

prevalence rate of 1.4% (Bhattacharjee et al., 2018). The two studies occurred at a time during which the USPSTF recommendation for depression screening among adults was dependent on the presence of programs that could assure follow up treatment of those that screened positive (Siu et al., 2009). The recommendation was subsequently revised to accommodate screening for all adults irrespective of available capacity to follow up with treatment (Siu et al., 2016). The low prevalence reported by these authors could have been a factor of the older recommendation by USPSTF (Bhattacharjee et al., 2018).

There is evidence that residents and physicians working in specialties other than psychiatry are not adequately prepared to recognize depression. Dietrich and colleagues (2003) conducted a survey among obstetrics/gynecology residents in their final year or recent graduates concerning their attitude related to depression care. They found that less than 50% of the respondents acknowledged that they were well prepared to identify depression in their patients. Not more than 12% of the respondents routinely inquired about depressive symptoms, and the recognition of symptoms was predominately based on patients' distressed appearance as well the patient talking about depression directly. The role of primary care physicians in depression screening has also been studied. Glasser et al. (2016) conducted a cross-sectional study of primary care physicians regarding their attitudes and practices in managing depression in the post-partum period. Family medicine physicians were found to be more willing than pediatricians to screen for depression. However, there was no difference between physicians by gender when comparing all respondents.

Depression Screening Recommendation and Patient Outcome in Cancer

Cancer continues to be the leading cause of death in the U.S. with more than 1,806,590 estimated new cases and 606,520 deaths expected in 2020 (Siegel et al., 2020). Considering the advancement in cancer diagnostics and treatment options, the overall outcome of cancer cases can still be described as poor, and cancer is still one of the most dreaded diseases. Comorbidity with depression contributes an additional burden to patients that are affected. For example, the quality of life of patients with comorbid cancer and depression is significantly lower compared to cancer patients without depression (Wondimagegnehu, et al., 2019). This reduced quality of life has been partially attributed to the frequent lack of recognition of depression in cancer patients. As a generalization, there are indications that there is a high prevalence of undiagnosed depression in the general and cancer populations (Popoola & Adewuya, 2012; Lloyd-Williams, 2003). Williams, et al. (2017) explored the prevalence of undiagnosed depression in a lower-income neighborhood in northern Manhattan, and reported that approximately 7.6% of depressed patients go unrecognized, leading to a missed opportunity for screening, and this missed opportunity is associated with greater mortality and reduced quality of life. Several guidelines support recommendations that patients diagnosed with cancer be routinely screened for the presence of psychological distress, including depression (Kitchener, et al., 2014). The National Comprehensive Cancer Network (NCCN) established a panel comprising an interdisciplinary group that published a guideline recommending that all cancer patients be routinely screened for distress and psychosocial needs. The panel came up with a broad definition of distress as a "multifactorial, unpleasant experience of a psychological (i.e., cognitive, behavioral,

emotional), social, spiritual, and/or physical nature that may interfere with one's ability to cope effectively with cancer, its physical symptoms, and its treatment" (NCCN, 1999). Distress was described along a continuum to include depression. Three years after the initial guideline from NCCN, the U.S. National Institutes of Health (NIH) convened a state-of-the-science conference and recommended that cancer patients be routinely screened for depression using brief screening tools (National Institutes of Health, 2003). In 2007, the Institute of Medicine (IOM) released a report that showed that the psychological needs of cancer patients were not adequately addressed and similar to other guidelines, recommended that cancer patients be screened for psychological distress (Institute of Medicine, 2007). Also, routine depression screening of all adults has been recommended by the U.S. Preventive Services Task Force (USPSTF) since 2009 (Siu et al., 2016).

Studies have explored the linkage between screening for depression and appropriate treatment following the screening. There is evidence that depression treatment in the general population is associated with a better outcome and good response to treatment (Duval et al., 2006). However, some studies have shown that not all screening culminates in follow-up care for depression. For example, a study showed that at six-month follow-up of depression screening in a community health fair, none of the participants that screened positive for depression and were given a referral made a follow-up appointment at the community mental health agency (Opperman et al., 2017). However, it is essential to note that the authors did not factor the fact that some participants could have followed up with other health care providers outside of the

referral agency. Indeed, the authors recommended integrating and evaluating the effectiveness of a brief on-site consultation by mental health professionals to assess any potential depressive f symptoms fully.

Depression Screening in Cancer Patients

The importance of screening tools in the assessment of depression among patients with cancer cannot be over emphasized. Depression continues to pose a significant psychological disruption among cancer patients, especially because it is often unrecognized and inadequately treated (Caruso et al., 2017). Approximately 50-60% of cancer patients with depression are unrecognized in clinical practice (Grassi et al., 2010). In response to the trends in depression recognition and treatment in cancer patients, several guidelines and screening instruments have been developed (Siu et al., 2016; Kitchener, et al., 2014). Examples of screening instruments that have been used in screening depression among cancer patients include:

1. The nine-item Patient Health Questionnaire (PHQ-9)
2. The Distress Thermometer (DT)
3. The Hospital Anxiety and Depression Scale (HADS)
4. The Psychological Distress Inventory
5. The Brief Symptom Inventory
6. The Edinburgh Depression Scale
7. The Zung Self-Rating Depression Scale
8. Single-item interview
9. The Beck Depression Inventory (BDI)

10. The Hopkins Symptom Checklist (HSCL)

11. Center for Epidemiologic Studies Depression Scale (CES-D)

Wakefield et al (2015) conducted a meta-review of patient-reported depression measures used in screening depression in the oncology space. This included a review of more than 50 depression screening measures that are used in patients with any cancer type. The authors reported that while the HADS was the most widely studied screening instrument, the wide variability in its recommended cut-points represents an important limitation to its use. The BDI was notably highlighted as a more generalizable screening instrument across cancer types and disease stages with greater potential for screening and case finding. Relative to responsiveness, the Center for Epidemiologic Studies Depression Scale (CES-D) was reported to be the best-weighted measure.

Several authors have explored the ability of different screening procedures to detect mood disorders, including depression among cancer patients. For example, Wagner et al (2017) explored the feasibility, sensitivity, and specificity of commonly used screening instruments to detect depression among cancer patients receiving definitive or palliative radiotherapy in community-based radiation oncology settings. The authors found a good completion rate of the depression screening procedures, indicating that depression screening in the oncology settings is highly feasible. While comparing the ability of the PHQ-2, PHQ-9 and National Comprehensive Cancer Network-Distress Thermometer (NCCN-DT) to detect depression, they concluded that the PHQ-2 is an effective tool for identifying cancer patients with mood disorders, including depression, and is comparable to the longer PHQ-9 and superior to the widely used NCCN-DT.

Other authors have studied the accuracy of depression screening instruments among specific cancer patients. Katz et al (2004) examined the BDI, the HADS and the CES-D scale among ambulatory head and neck cancer patients who had received radiation and who were evaluated for major and minor depression using the Schedule for Affective Disorders and Schizophrenia (SADS). While all three depression instruments were reportedly accurate in terms of sensitivity, specificity and positive predictive value (PPV), the HADS demonstrated the highest level of accuracy and was found to be potentially most useful. Similarly, the diagnostic accuracy of four different depression screening instruments (CES-D, BDI-FastScreen, PHQ-9, and a 1-item screener- "Are you depressed?") were compared to the gold standard structured Clinical Interview-DSM IV among ovarian cancer patients undergoing treatment (Shinn et al., 2017). The authors concluded that the PHQ-9 had the best diagnostic accuracy among the four screening instruments explored. The CES-D with the traditional cutpoint of 16 and the one-item screener were the worst methods.

Some authors have explored the degree of agreement between HADS and clinical assessment outcomes as a function of age, sex, and treatment intention. Thalén-Lindström et al., (2016) reported a moderate agreement between HADS and clinical assessment for identifying depression among 146 oncology patients with either curative or palliative treatment intention. However, the greatest difference between HADS and clinical assessment was found to be on the basis of age and sex. While agreement was determined to be better for females compared to males for distress and anxiety, agreement was better for participants age ≥65 year compared to participants age <65 year

in relation to depression. Agreement between HADS and clinical assessment was moderate in relation to whether the treatment intention was curative or palliative.

A variety of cut-off scores have been recommended for each of the depression screening instruments. The relatively wide variation has led to some degree of challenge over where to set the threshold for identifying depression cases among cancer patients. Vodermaier and Millman (2011) conducted a meta-analysis to identify empirically derived cut-offs for the HADS, which is the most widely validated scale for screening for emotional distress in cancer patients. The authors reported that the HADS total scale and HADS depression subscale demonstrated good accuracy for measuring depression, compared to mental disorders in general. On the HADS total, HADS depression subscale, and HADS anxiety subscale, they identified a threshold of 15, 7, and 10 or 11, respectively, as an appropriate cut-off for depression screening.

Several other screening methods have been developed for use in identifying depression among cancer patients. Most of the assessment methods were developed to overcome specific challenges peculiar to traditional screening instruments. For example, the use of a smart phone application for screening for depression could potentially eradicate the barrier posed by regular screening in patients who rarely visit their physicians (Kim et al., 2016). Kim et al (2016) conducted the first study that examined the validity of a mobile app depression screening device among patients with breast cancer. The authors compared the performance of depression screening using a mobile mentalhealth tracker with the results from PHQ-9 tests and reported that the two screening methods where comparable. The expression of certain emotional states,

including depression, is known to be affected by cultural background, whereby some cultures do not encourage negative expression considered disruptive (Bae & Park, 2016). Therefore, the use of depression screening tools that can by-pass the need for patients to complete questionnaires about their symptoms could be valuable. Kim, et al (2018) evaluated the use of Diagnostic Drawing Series (DDS) as a screening tool to identify psychological distress among breast cancer patients, which could supplement the traditional depression screening questionnaires. The authors concluded that DDS could be used as a supplemental screening tool to identify psychological distress, including depression, among breast cancer patients.

Summary

Chapter two represents a synthesis of the information on the screening for depression among cancer patients in the ambulatory care setting in the U.S. The various predictors and determinants of depression screening were also reviewed. The prevalence of cancer and depression and their comorbidity was discussed. A thorough review of the potential pathophysiology, interaction, and explanation of why depression may co-occur with cancer was presented. Evidence suggests defective coping mechanisms, psychological reactions, mere coincidence, and social and biological mechanisms.

A review of the barriers to and access to depression screening guided the opportunity to explore the potential determinants of depression screening in cancer patients. The review of the literature uncovered that there is a scarcity of information regarding the predictors of depression screening specifically among patients diagnosed with cancer. The extensive review of the historical path of screening and the local and

international guidelines provided context to the importance of screening and important criteria to be considered before making decisions on whether to screen for a particular disease.

Finally, the different depression screening instruments that have been validated for use in cancer patients were explored. While there are several instruments that have been validated, the varying cut-offs represent a challenge in deployment among patients. The HADS is the most widely used, while the PHQ-9 appears to have the best diagnostic accuracy.

Overall, there is limited to no information on the predictors of depression screening among cancer patients. The current review explored existing literature but is in no way exhaustive or conclusive about all the potential predictors. One of the major findings of the current literature review is the uncovering of a need for further research work in identifying the predictors of depression screening among cancer patients. The current research study sought to identify some of the potential predictors of depression screening using the HBM as the theoretical background. The study analyzed secondary data from the National Ambulatory Medical Care Surveys (NAMCS). Chapter three outlines and discusses both the quantitative and the methodological approach needed to scientifically summarize and analyze the data.

Chapter 3: Research Method

Introduction

The purpose of this study was to explore and establish the factors that predict depression screening among cancer patients in the ambulatory care setting in the United States. Suitable statistical analyses were conducted to determine whether each of the proposed predictors impacts the likelihood of cancer patients undergoing depression screening. Several guidelines have recommended depression screening among cancer patients. This study gives support for that recommendation and for all efforts geared toward the prompt identification of cancer patients who may require additional treatment for depression.

This study's findings may contribute to the development of tailored interventions targeted at factors in cancer patients that predispose them to not screening for depression. The correlation between depression and poor cancer survivability has underscored the need for timely screening for depression accompanied by adequate treatment (Sherrill et al., 2017). To further explore how depressed cancer patients can be identified more quickly and get connected to much-needed treatment, I sought in this study to determine the potential predictors of depression screening among cancer patients. Depression screening is an important first step toward identifying cancer patients at risk for depression; therefore, the importance of understanding the determinants of screening cannot be overemphasized. While there are authors who have explored predictors of depression screening among the adult population, there are currently no studies in the literature that have sought information on factors that predict which cancer patients will

get screened for depression.

In this chapter, I describe the research design and rationale and discuss the study methodology, including the population and sampling procedures. Potential validity threats and ethical procedures are also addressed. The chapter concludes with a summary of all procedures highlighted.

Research Design and Rationale

This study used data from the NAMCS. The NAMCS is a publicly available national survey conducted by the NCHS of the CDC (NCHS, n.d.-a). The initiative is part of the National Health Care Survey's effort to measure healthcare utilization across various healthcare providers. Specifically, the survey was created to generate objective, reliable data about the provision and utilization of ambulatory medical care services in the United States. In this study, I analyzed visits to nonfederally employed, office-based physicians directly involved in patient care. The category of office-based physicians excluded radiologists, anesthesiologists, and pathologists. Using the dataset, I specifically examined those physician visits that involved the exploration of depression screening among cancer patients.

Research Design

A cross-sectional design was used in this study. The data that I analyzed originated from the 2014-2016 NAMCS database. The NAMCS database contains information from an annual probability survey sent to participating nonfederal office-based physicians within the 50 U.S. states and the District of Columbia. The physicians who took the survey were selected using an intricate sampling design, resulting in a

systematic random sample of office-based visits. The U.S. Bureau of the Census acts as the field data collection agent for the NAMCS.

The data collection strategy was designed to minimize data collection workload and to maintain approximately equal reporting levels among sample physicians, irrespective of their practice size. The process was achieved through data collection (performed by the physician or physician's staff) from 30 randomly selected patient visits during a randomly assigned, 1-week reporting period (NCHS, n.d.-b). Based on the cross-sectional view afforded by the NAMCS dataset, it is scientifically justifiable to identify independent variables that could potentially predict the independent outcome of depression screening.

Data Eligibility Criteria

In 2016, the U.S. Preventive Services Task Force (USPSTF) updated its guidelines to include a recommendation for routine depression screening in patients age 12-18 years (Siu et al., 2016). Rates of depression among adolescents and young adults with cancer are higher than those in older adults with cancer (Park & Rosenstein, 2015). Therefore, visits for adolescents were included in the study. Specifically, visits for patients who were ≥ 12 years of age, with or without depression and with a diagnosis of cancer, who made an ambulatory care visit to an office-based physician were included in the study.

Visits were excluded if "yes" was not indicated for the question "Does patient now have cancer?" Visits to physicians in the anesthesiology, pathology, and radiology specialties, including designated subspecialties, were also excluded from the study. All

patient visits that were primarily related to conditions in which depression screening would be highly unlikely to occur, such as visits related to injuries and for administrative purposes, were also excluded. It is also important to note that only office-based visits to a physician were included in the dataset. Federally based physician office visits were not included in the dataset.

Case Definition

The identification of patients with cancer and depression, and thosewho had undergone depression screening during ambulatory care visits, was determined based on the provider's affirmation in response to specific questions. Cancer ambulatory care visits were selected if the provider indicated an affirmative response to the question "Regardless of the diagnosis previously entered, does the patient now have cancer?" The event was recorded irrespective of the list of diagnoses related to the current visit.

Cancer included any cancer type and was generally not limited to any specific body site. Similarly, depression was identified whenever the provider checked the box corresponding to the question "Regardless of the diagnosis previously entered, does the patient now have depression?" During a visit, the provider marked all services, including examination and screening, provided during that visit. In the NAMCS database, depression screening was dichotomized with a yes/no response. No specific depression screening type or procedure was identified. There was also a section on the NAMCS patient record designated as "providers." The type of provider seen at the visit was indicated, with possible selections including physician, physician assistant, nurse practitioner/midwife, RN/LPN, mental health provider, other, and none.

Additionally, the patient's age (in years, months, and days), sex, and race were collected. For this study, age, sex (defined as male or female), race (defined as White, Black or African American, Asian, Native Hawaiian or Other Pacific Islander, or American Indian or Alaska Native), and physician specialty represented the independent variables, while depression screening was the dependent variable. Geographic regions included Northeast, Midwest, South, and West.

Methodology

Population

The number of new cancer cases worldwide has been projected to reach approximately 26 million, with 17 million cancer deaths per year by 2030 (Thun et al., 2010). In the United States, close to 2 million new cases of cancer have been estimated to occur in 2020, with approximately 34% of those patients expected to die in 2020 (Siegel et al., 2020). The prevalence of depression among newly diagnosed patients and patients chronically affected by cancer is significant (Wagner et al., 2017; Walker et al., 2013). Depression screening has been recommended to identify cases promptly and connect patients with treatment (Siu et al., 2019).

For this dissertation, the study population included patients visiting the ambulatory care setting in the United States with a cancer diagnosis. The NAMCS captures nationally representative healthcare services provided in ambulatory care settings in the United States. Surveys are administered cross-sectionally to record physician-patient encounters or visits. For the purpose of the survey, a visit was defined as "a direct, personal exchange between a physician, or a staff member operating under a

physician's direction, for the purpose of seeking care and rendering health services" (NCHS, 2017a). The study sample included both male and female patients 12 years of age and above who reported a diagnosis of cancer at an ambulatory care visit.

Sampling and Sampling Procedures

Sampling Strategy

Secondary data were drawn from 3 consecutive years of the NAMCS (i.e., from 2014 to 2016). These data pertained to depression screening among patients with a current diagnosis of cancer. The survey response rates for physician-level responses for the core NAMCS samples covered in this study in 2014, 2015, and 2016 were 54.8%, 46.0%, and 46.0% (weighted), respectively. The sampling design of the NAMCS consists of a cross-sectional, multistage probability survey of visits to office-based physicians. A stratified two-stage sample in which physicians were selected in the first stage and visits were selected in the second stage was used as the sampling design. The American Medical Association and American Osteopathic Association maintained the master files from which a stratified sample list of physicians was selected.

Each of the sampling strata was defined by census region and physician specialty group. The census regions included Northeast, Midwest, South, and West. The 15 physician specialties that were included were as follows:

- general and family practice,
- osteopathy,
- internal medicine,
- pediatrics,

- obstetrics and gynecology,
- general surgery,
- orthopedic surgery,
- cardiovascular diseases,
- dermatology,
- urology,
- psychiatry,
- neurology,
- ophthalmology,
- otolaryngology, and
- a residual category for all other specialties.

Dataset Access

This study used the NAMCS dataset. The NCHS offers the NAMCS data as freely downloadable, public-use data files through the CDC FTP file server. Permission is not required to download the data. The service is freely available to users, and appropriate datasets, documents, and questionnaires from NCHS surveys, including all data collection procedures, can be downloaded. Instructions for downloading files are provided on the website in "readme" files. The data are available in self-extracting, compressed data files. Data extraction is complete after downloading the data. All that is therefore needed to access the dataset is access to the internet. The dataset is available for download to be used with various statistical software, including SAS, STATA, and SPSS. I downloaded 2014 through 2016 survey data that were saved in SPSS format.

Power Analysis

An essential aspect of study design is sample size calculation. The sample size refers to the number of study participants who need to be enrolled in a research study to detect a clinically significant treatment effect. Simply put, sample size is the number of participants in a sample (Kadam & Bhalerao, 2010). While a study with an inadequate sample size may make it difficult to detect any meaningful effect, having too many respondents included in a sample may impact the results of a research study by producing a statistically significant yet clinically insignificant result (Hickey et al., 2018). This important methodological concept underscores the importance of appropriately calculating the sample size at the study design stage of a research project.

To determine the sample size for this study, I utilized the computer software G*Power 3.1 (Faul et al., 2009). This software is available for free download and installation and has an intuitive interface that eliminates unnecessary complications related to sample size determination. There are two crucial points that users must note before conducting sample size calculation using this software:

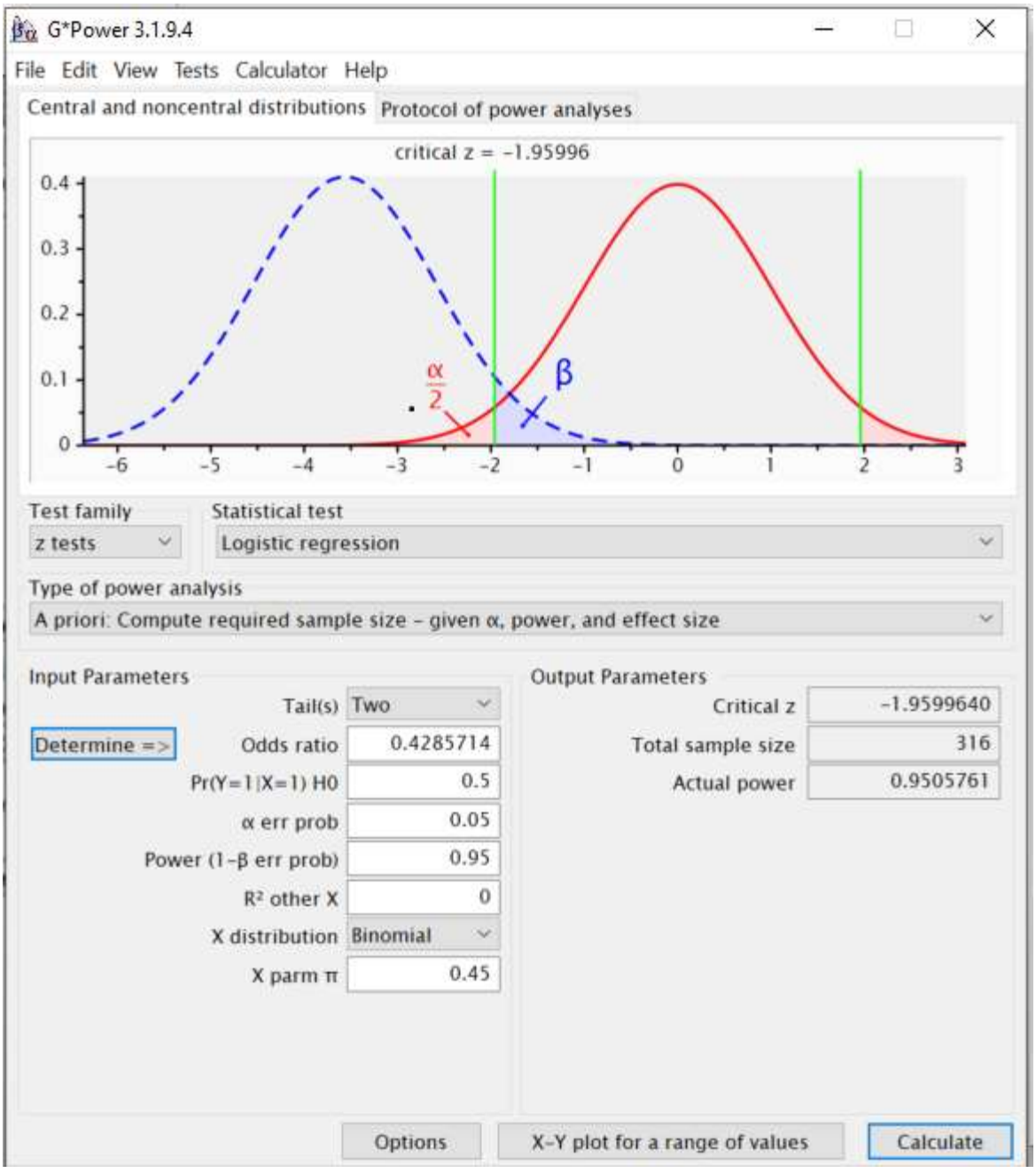
1. The researcher must determine the right statistical test to use.
2. The researcher must understand what the predictor variables are.

The software allows the user to choose a statistical test; for this study, I chose logistic regression. Logistic regression aligned with my research question, with a dichotomous dependent variable and both binary and continuous independent variables. The odds ratio option was selected for entering the expected effect size. The study tested whether different independent variables (e.g., sex as a dichotomous variable) were

significant predictors of a binary outcome variable. In the G*Power software, two tails were chosen, and for test family and statistical test, the *z* test and logistic regression were selected. The power calculation was based on the assumption that for gender, women and men with cancer will have a 50% and 30% probability of being screened for depression, respectively. The error probability was set at 0.05, and to be able to demonstrate an association between the independent and dependent variables, given that an association exists, the power was set at 0.95. Based on these parameters, the sample size was set at 312. Figure 1 shows the G*Power calculation.

Figure 1

*Sample Size Calculation Using G*Power 3.1*



Instrumentation and Operationalization of Constructs

NAMCS was launched in 1973 and developed as a product of more than six years of intensive research aimed at determining the feasibility of the survey and testing alternative methods for conducting the survey (NCHS, 1988). There has not been an extensive independent effort to validate the instruments used in the NAMCS surveys. Since the beginning of the surveys' deployment, there have been only a few studies that have examined the validity of the questionnaires used in NAMCS. Gilchrist et al. (2004) compared the NAMCS measurement approach with direct observation of outpatient visits, including office visits of 549 patients visiting 30 family physicians. As observed by trained research nurses, the visits were compared with data reported by physicians during the 1993 NAMCS survey deployment. While there was generally a good concordance between the NAMCS method and direct observation method for reports of procedures and examinations (including screening procedures), this was not the case for health behavior counseling. The result showed that reports from NAMCS may be more accurate for procedures and examination than for health behavior counseling. However, since its inception, the NAMCS has been a source of good data to describe U.S. primary care. There is evidence that the method of survey used is well established and provides nationally representative information on physician office visits (NCHS, n.d.-a).

While most of the surveys were completed either through a paper instrument or electronically through the web-based instrument, it is important to note that three different methods were used in collecting the data; namely, through a self-administered web-based instrument completed electronically, a paper instrument that was self-

administered and subsequently returned via mail, and the use of a computer-assisted telephone interview. The physicians selected in the sample were initially contacted by mail, in which a brief description of the survey was conveyed, and they were asked for their participation. In the next phase, field representatives contact the physicians by a phone call to set up an appointment for an in-office visit. At the in-office stage, the survey is explained more extensively, and approval to participate in the survey sought. For the physicians that agree to participate, a week is randomly assigned for the team to complete the survey, after which the physician mail the finished survey to the field representative. Data are collected using the patient log and the patient record.

Data Analysis Plan

This study's data source was the NAMCS, a national probability sample survey of visits to office-based physicians and community health centers conducted by the NCHS. IRB approval was sought and received before analyzing the dataset. The primary outcome variable was depression screening (yes/no). Independent variables that were explored include consultation with a mental health provider, time spent with the physician, gender, age, and race of patient, and physician specialty. Each of the independent variables were examined to determine if they served as predictors of depression screening in cancer patients during regular office visits with a physician.

SPSS 25 was the statistical package that was used for all data analyses. The means or the relative frequencies or proportions and the standard errors (SE) of the independent variables were reported. To test whether the independent variables can predict the dependent variable, I performed a logistic regression analysis. The logistic

regression is the appropriate regression analysis to perform to determine or describe the relationship between a qualitative dependent variable that takes the form of a dichotomous variable and an independent variable. It can compute the odds ratio in the context of greater than one exploratory variable (Sperandei, 2014). Its use of a binomial response variable represents one of the main differences between it and multiple linear regression. In this study, the dependent variable were dichotomized, while the independent variables included both categorical variables such as gender and race, and continuous variables such as age. This approach aligns well with analyzing the dataset using logistic regression. Where appropriate, I presented the odds ratios (ORs), 95% confidence intervals (CIs), and the *P* values. Statistical significance was set at $p<0.05$. As part of the strategy to emphasize any signals in the data while excluding all potential "noise," I conducted data preparation to include recoding, assessing for variable reconstruction, and handling missing data (Kang, 2013).

Coding of Responses

All the responses from the NAMCS dataset in SPSS were coded appropriately to fit logistic regression analysis. All dichotomous variables were assigned a code of 0 and 1. For example, the value “0” was used to code for a “no” or similar response, while the value “1” was assigned to all responses that are “yes” or similar. For continuous independent variables, higher value represents more of the variable of interest.

Missing Data

My approach to handing missing data is described next. The tendency for introducing bias to subsequent statistical analyses when the missing data are greater than

10% is valid (Bennett, 2011). I explored all the main variables that were included in the analysis for missing data and logical inconsistencies. The skip pattern and section flow were examined in order to check for structural missing versus missing due to "refusal" or "don't know" responses. The mean replacement method or the median replacement method in SPSS were used for missing data. When non-response occurs at an individual level, I made a decision on whether the data will be used or excluded.

The Data Dictionary

The data dictionary is discussed in this section for the purpose of defining the scope and characteristics of data elements used for analysis, and applicable rules that govern their application. Some examples of variables that are contained in the data dictionary for the research are presented in Table 1.

Table 1

Data Dictionary

Column name	Column type	Column width	Column description	Measure
DEPRN	Numeric	1	Does patient now have: Depression	Unknown
DEPRESS	Numeric	1	Depression screening	Unknown
CANCER	Numeric	1	Does patient now have: Cancer	Unknown
Age	Numeric	3	Patient age in years	Unknown
SEX	Numeric	1	Patient sex	Unknown
MHP	Numeric	1	Mental health provider seen	Unknown
TIMEMD	Numeric	3	Time spent with physician in minutes	Unknown
RACER	Numeric	1	Patient race—imputed	Unknown
SPECR	Numeric	2	Physician specialty—14 groups	Unknown
REGIONOFF	Numeric	1	Region where majority of physician's sampled visits occurred	Unknown

Research Questions and Hypotheses

RQ1. Is there an association between consultation with a mental health provider and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between consultation with a mental health provider and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between consultation with a mental health provider and screening for depression among patients with a diagnosis of cancer.

RQ2. Is there an association between time spent with the physician and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between time spent with the physician and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between time spent with the physician and screening for depression among patients with a diagnosis of cancer.

RQ3. Is there an association between gender and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between gender and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between gender and screening for depression among patients with a diagnosis of cancer.

RQ4. Is there an association between age and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between age and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between age and screening for depression among patients with a diagnosis of cancer.

RQ5. Is there an association between race and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between race and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between race and screening for depression among patients with a diagnosis of cancer.

RQ6. Is there an association between physician specialty and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association

between physician specialty and screening for depression among patients with a diagnosis of cancer.

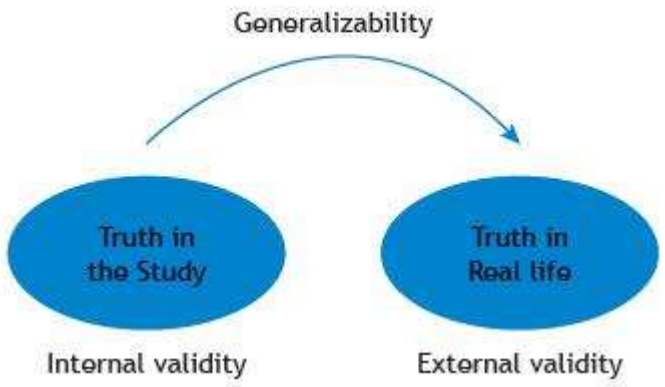
Alternative hypothesis (HA): There is a statistically significant association between physician specialty and screening for depression among patients with a diagnosis of cancer.

Threats to Validity

It is worth noting some potential threats to validity, both internal and external, related to this study. Internal and external validity are indicative of the instruments' properties, including questionnaires or surveys, and the population selected and used to collect data. Both concepts generally refer to a lack of systematic error. A pictorial representation of the concept of study validity is depicted in Figure 2.

Figure 2

Schematic Representation of Validity



Internal Validity

The avoidance of major methodological problems and studies free from biases are the hallmarks of research with high internal validity.

Selection bias: The NAMCS uses a sophisticated, well-planned, three-stage, stratified cluster design in selecting participating respondents. For example, in the first stage, the primary sampling unit is selected with a probability proportional to population size and consists of identifying the county or group of counties of interest. The second stage is selected based on a probability inversely proportional to the number of physicians in the primary sampling unit. The third stage is selected based on the visits to a physician's office. The three-stage, stratified cluster design ensures that there is no selection bias in terms of selecting participants for the survey. Also, while the sampling plan does not necessarily guarantee that all physicians and physician visits are sampled, it does ensure a reasonable representation.

External Validity

The ability to apply the results obtained from this study to a population broader than the one used in the study is referred to as external validity or generalizability (Patino & Ferreira, 2018). Therefore, it is crucial to consider the extent to which the respondents studied are representative of the more general population. Typically, this is done by characterizing and comparing those who did not participate in the study with those who did participate to identify any differences.

For the study, I analyzed secondary data from the NAMCS dataset, which has an intricate survey design. Ward (2018) extensively demonstrated the impact of using inappropriate methods of estimation, known as an analytic error, in analyzing survey data from a complex survey design such as the NAMCS dataset and its effect on the generalizability of results. Specific examples include not applying data weights,

overlooking the foundational complexity of survey design, and deficiently subsetting data during subpopulation analysis. A proper understanding of the survey data and the use of the appropriate estimation techniques will go a long way as part of the strategies to mitigate the problem.

Ethical Procedure

The secondary dataset used in the study is from NAMCS, which is a freely available public dataset. The survey is administered by the NCHS, which is legally responsible for ensuring the confidentiality of all responses. This includes all potential data collected that may result in a physician or hospital being de-identified. Therefore, all information released publicly and used for research does not include any provider or patient identifying information. The survey data generally describes the characteristics of visits to ambulatory care services and may consist of data elements such as patient demographic characteristics, patients' condition most often treated, and the diagnostic procedures and treatment that was given. Researchers intending to use NAMCS are expected to comply with data use restrictions to ensure that all information obtained from the dataset are used only for statistical analysis or reporting purposes. The data use restrictions agreement is available at https://www.cdc.gov/nchs/data_access/restrictions.htm. Therefore, the following efforts were made to ensure the confidentiality of individuals and establishments included in the dataset:

- All datasets downloaded from NCHS were used for statistical analysis only.
- No attempt was made to identify respondents included in the dataset.

- The dataset was not linked with individually identifiable data from other NCHS or non-NCHS datasets.
- I did not engage in any activity with the intention of re-identifying individuals and establishments included in the dataset.

Furthermore, the Walden university Internal Review Board (IRB) is tasked with ensuring that all research conducted in the University follows the Walden University's ethical standards and U.S. federal regulations. Prior to the analysis of the secondary data, approval was obtained from the Walden University IRB. In case there is a need for a third party to review the dataset, I ensured they were trained in human subject research and Health Insurance Portability and Accountability Act (HIPAA) regulations before giving them access to the dataset. Any deviation to the research plan was planned to be promptly reported to the Walden University IRB.

Summary

In this chapter, I discussed extensively the research design. The variables that will be used were discussed concisely. A thorough review of the methodology, including the population, sampling, and sampling procedures, was presented. The sampling frame, including the eligibility criteria, as well as the power analysis, were highlighted. The instrumentation and operationalization of the survey to be used were also discussed. Finally, I transitioned to discussions related to validity threats and ethical procedures involved in the conduct of the research. In Chapter four, I present the results of the analysis of the secondary dataset.

Chapter 4: Results

Introduction

In this chapter, I summarize the results of the analyses performed. The logistic regression was used to determine whether there was any predictive association between the independent and dependent variables. Specifically, the study used the logistic regression to explore whether consultation with a mental health provider; time spent with the physician; patient gender, age, and race; and physician specialty were predictors of depression screening among patients with cancer attending ambulatory healthcare settings in the United States. To further investigate the effects of other potential predictors, additional post hoc analyses were conducted, and results are presented in this section.

The purpose of this research was to determine and evaluate the predictors of depression screening among cancer patients in ambulatory care settings in the United States. This work contributes to the body of literature by increasing knowledge about determinants of depression screening among cancer patients related to crucial patient and physician characteristics. The study may also stimulate new approaches to recognizing and managing patients with comorbid conditions and informing public debates, policy-making strategies, and screening guidelines.

Research Questions and Hypotheses

RQ1. Is there an association between consultation with a mental health provider and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association

between consultation with a mental health provider and screening for depression among patients with a diagnosis of cancer.

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Null hypothesis (H0): There is no statistically significant association between time spent with the physician and screening for depression among patients with a diagnosis of cancer.

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Alternative hypothesis (HA): There is a statistically significant association between gender and screening for depression among patients with a diagnosis of cancer.

RQ4. Is there an association between age and screening for depression among

patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between age and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between age and screening for depression among patients with a diagnosis of cancer.

RQ5. Is there an association between race and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between race and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between race and screening for depression among patients with a diagnosis of cancer.

RQ6. Is there an association between physician specialty and screening for depression among patients with a diagnosis of cancer?

Null hypothesis (H0): There is no statistically significant association between physician specialty and screening for depression among patients with a diagnosis of cancer.

Alternative hypothesis (HA): There is a statistically significant association between physician specialty and screening for depression among

patients with a diagnosis of cancer.

Data from the NAMCS comprising a national probability sample of visits to the emergency and outpatient departments of noninstitutional general and short-stay hospitals were accessed and analyzed to answer the research questions. The NAMCS consists of nationally representative data about outpatient practice in the United States. In this chapter, I present the results of the statistical analysis of the NACMS secondary dataset comprising merged datasets from 2014 through 2016. In the subsequent sections, I describe both the descriptive and inferential analyses. The chapter concludes with a summary, including a transitional summary that leads to this project's final chapter.

Results

The 2014–2016 NAMCS datasets included 87,207 ambulatory care visits. A total of 7,146 visits by patients age 12 years and above who were diagnosed with cancer met the study inclusion criteria. Depression was reported at 9% of visits. Depression screening occurred during 3.8% of the community-based physician practice visits. Key predictor characteristics were summarized by categorical and continuous variables. Summaries included mean, standard deviation, minimum and maximum for continuous variables, and counts/frequencies and percentages for categorical variables. Information about the categorical variables for the population is provided in Tables 1–5, and information about the continuous variables is provided in Table 6.

The age variable was subdivided into five categories: (a) 12-22 years, (b) 23-42 years, (c) 43-62 years, (d) 63-72 years, and (e) 73 years and older (Table 2). Physician visits involved patients who were predominantly 73 years and older (39.3%). Patients in

the age groups 12-22, 23-42, 43-62, and 63-72 accounted for 30 (0.4%), 331 (4.6%), 1,823 (25.5%), and 2,154 (30.1%) physician visits, respectively. Figure 3 shows the clustered bar percentage of depression screening by age group. Patients in the age groups 63-72 and 73 and older were more likely to be screened for depression during physician office visits.

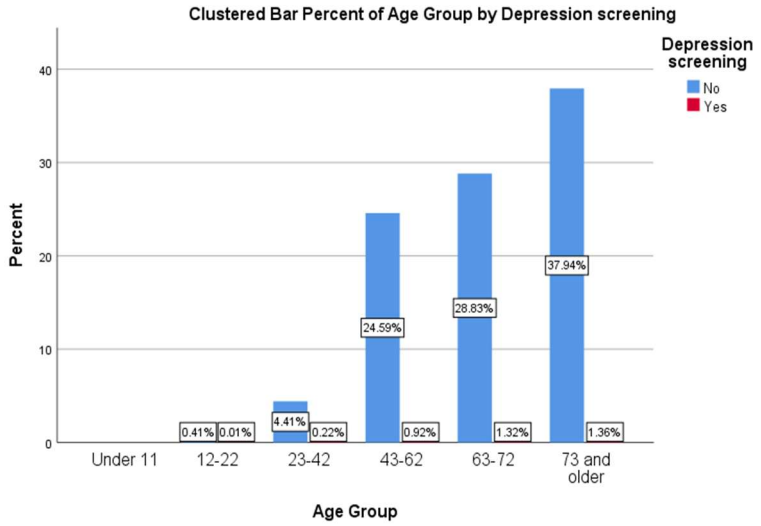
Table 2

Frequencies and Percentages of Patient Visits by Patient Age Group

Age group (years)	Frequency (*n*)	Percent (%)
12-22	30	0.4
23-42	331	4.6
43-62	1823	25.5
63-72	2154	30.1
73 and older	2808	39.3
Total	7146	100.0

Figure 3

Clustered Bar Percent of Depression Screening by Age Group



In terms of gender, more physician visits involved male patients, accounting for 3,641 (51%) visits (Table 3). The association between gender and depression screening was examined using the clustered bar chart in Figure 4, which shows that only 1.69% of male patient visits included screening for depression, while 2.14% of female patient visits included depression screening.

Table 3

Frequencies and Percentages of Patient Visits by Patient Gender

Gender	Frequency	Percent
Male	3,641	51.0
Female	3,505	49.0
Total	7,146	100.0

Figure 4

Clustered Bar Percent of Depression Screening by Gender

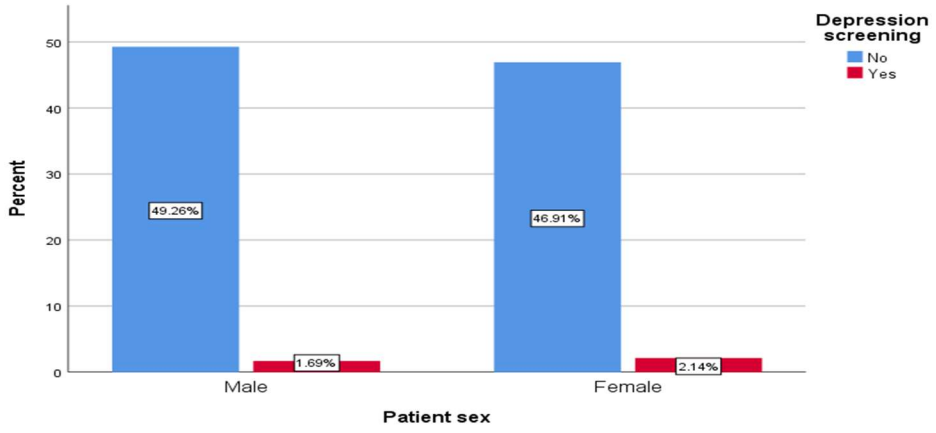


Table 4 shows the frequencies and percentages of the racial/ethnic group categories. The race variable was subdivided into four categories: (a) Non-Hispanic White, (b) Non-Hispanic Black, (c) Hispanic, and (d) Non-Hispanic Other. Physician visits involved patients who were predominantly Non-Hispanic White, accounting for 6,201 (86.8%) visits. Physician visits were somewhat comparable for the other racial/ethnic groups and accounted for 434 (6.1%), 352 (4.9%), and 159 (2.2%) for Non-Hispanic Blacks, Hispanics, and Non-Hispanic Other, respectively. Association between racial/ethnic groups and depression screening was examined using a clustered bar chart. Similar to Table 4, Figure 5 shows that most physician visits that included a depression screening occurred among Non-Hispanic Whites (3.29%), compared to 0.20%, 0.27%, and 0.08% seen in the categories Non-Hispanic Black, Hispanic, and Non-Hispanic Other, respectively.

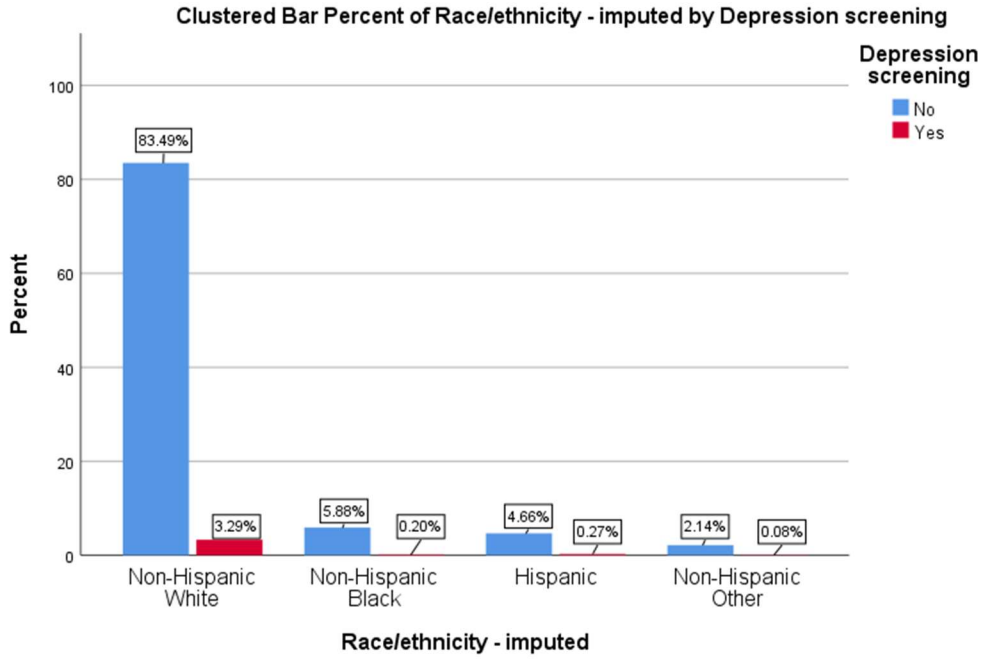
Table 4

Frequencies and Percentages of Patient Visits by Patient Race/Ethnicity

Ethnic groups/total	Frequency	Percent
Non-Hispanic White	6,201	86.8
Non-Hispanic Black	434	6.1
Hispanic	352	4.9
Non-Hispanic Other	159	2.2
Total	7,146	100.0

Figure 5

Clustered Bar Percent of Depression Screening by Race/Ethnicity



Furthermore, most physician visits, accounting for 1,816 (25.4%), were to physicians identified as having other specialties. Visits to dermatologists, urologists, and family physicians accounted for 1,146 (16.0%), 1,084 (15.2%), and 565 (7.9%), respectively, as shown in Table 5. The association between physician specialty and depression screening was also examined using a clustered bar chart. Figure 6 shows that depression screening was completed more among physicians with other specialties (1.39%), followed by primary care physicians (0.66%), internists (0.50%), and urologists (0.38%).

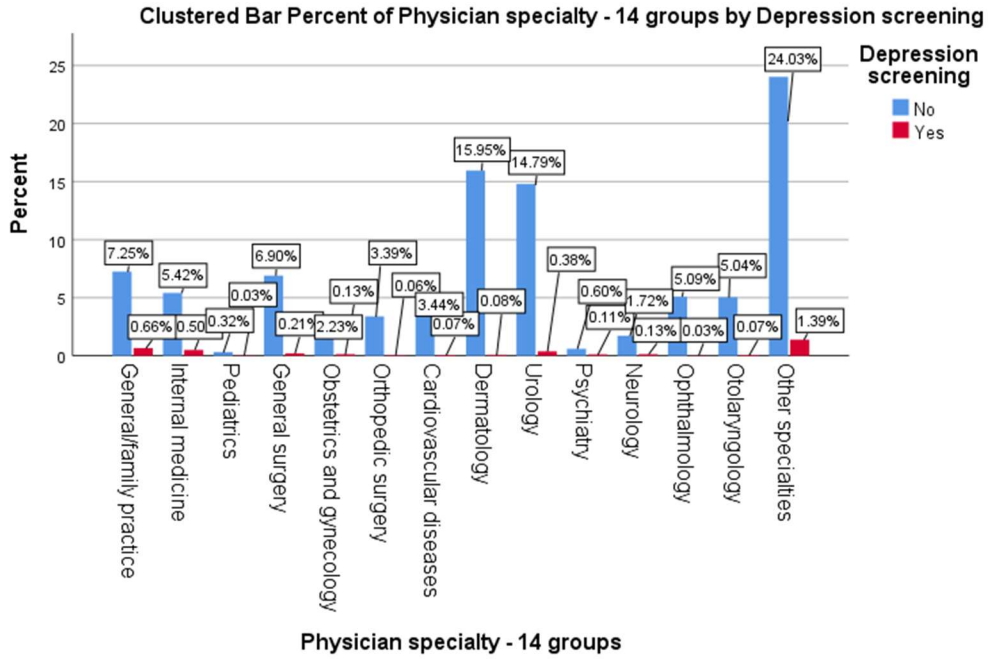
Table 5

Frequencies and Percentages of Patient Visits by Physician Specialty

	Frequency	Percent
General/family practice	565	7.9
Internal medicine	423	5.9
Pediatrics	25	.3
General surgery	508	7.1
Obstetrics and gynecology	168	2.4
Orthopedic surgery	246	3.4
Cardiovascular diseases	251	3.5
Dermatology	1146	16.0
Urology	1084	15.2
Psychiatry	51	.7
Neurology	132	1.8
Ophthalmology	366	5.1
Otolaryngology	365	5.1
Other specialties	1816	25.4
Total	7146	100.0

Figure 6

Clustered Bar Percent of Depression Screening by Physician Specialty



In terms of ambulatory visits involving consultation with a mental health provider, physician visits involved predominantly patients who did not consult with a mental health provider, accounting for 7,126 (99.7%) visits, as shown in Table 6. The association between consultation with a mental health provider and the outcome variable was examined using a clustered bar chart. Figure 7 shows that within the group that consulted with a mental health provider, only 0.03% of visits included screening for depression. In comparison, 3.81% of physician visits had depression screening among patients who did not consult with a mental health provider.

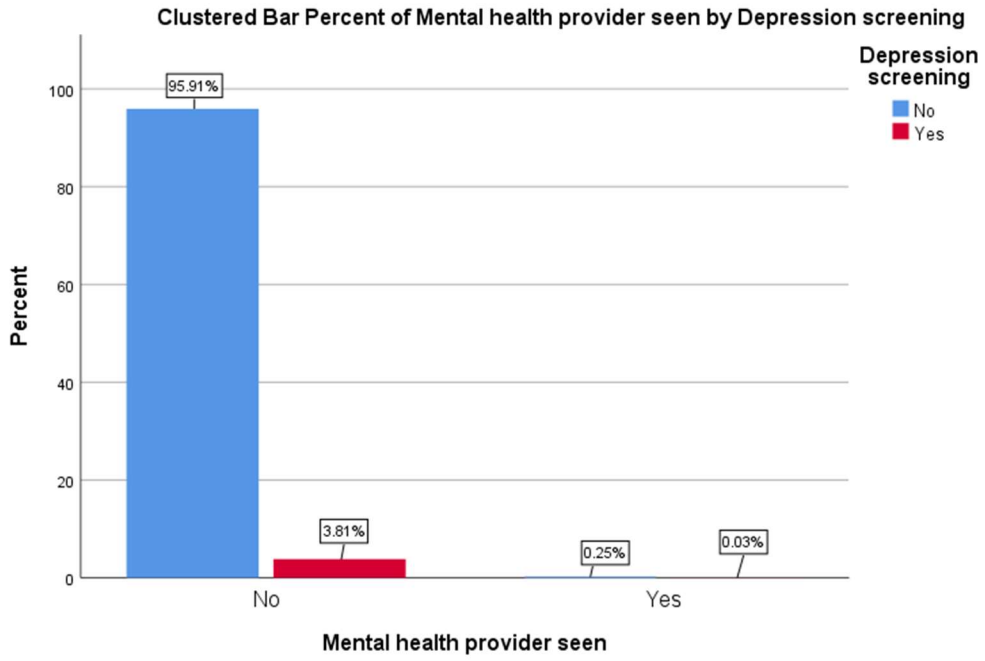
Table 6

Frequencies and Percentages of Patient Visits by Mental Health Provider Seen

Mental health provider seen	Frequency	Percent
No	7,126	99.7
Yes	20	.3
Total	7,146	100.0

Figure 7

Clustered Bar Percent of Depression Screening by Consultation With Mental Health Provider



Univariate Descriptive Statistics for Continuous Variables

The continuous variable was summarized by tabulations of n, mean, range, standard deviation, maximum, and minimum. The only continuous variable included in the analysis is "the time spent with physician." The variable was measured in minutes, with the minimum and maximum time spent being zero and 90 minutes, respectively. The mean time spent with a physician was 23.23 minutes with a standard deviation of 14.214. Table 7 shows the descriptive statistics for the continuous variables included in the analyses.

Table 7

Descriptive Statistics for Time Spent With Physician

	N	Range	Minimum	Maximum	Mean	Std. deviation
Time spent with physician in minutes	7,146	90	0	90	23.23	14.214
Valid *N* (listwise)	7,146					

Univariate Logistic Regression

Logistic regression was used to assess how well the set of predictor variables predicted or explained the categorical dependent variable of screening for depression (yes/no). The specific individual effect of each of the predictor variables on the outcome variable and the amount of variance explained by each predictor variable was explored. Simple logistic regression was performed for each of the research questions.

Research Question 1

The first research question explored whether there is an association between

consultation with a mental health provider and screening for depression among patients with a diagnosis of cancer. Simple logistic regression was performed to assess the impact of consultation with a mental health provider among patients with a cancer diagnosis on the likelihood that they will have a depression screening during that visit. Variables with *p*-values less than 0.05 represent those that contributed significantly to the predictive ability of the model. The full model containing the predictor (i.e., consultation with a mental health provider) was not statistically significant, χ^2 (1, N=7146) = 1.455, *p*=0.228, indicating that the model was not significantly better than the baseline model (i.e., the result of the analysis with only the dependent variable). The model explained between 0.0% (Cox and Snell R square) and 0.001% (Nagelkerke R squared) of the variance in depression screening and correctly classified 96.2% of cases. Table 8 shows that consultation with a mental health provider failed to make a unique, statistically significant contribution to the model. The odds ratio was 2.8. This implies that patients who consulted with a mental health provider during an ambulatory visit were almost three times as likely to report screening for depression as those who did not consult a mental health provider. However, this was not statistically significant (*p*=0.169). This is evidenced by a 95% CI that ranged between 0.646 and 12.127. Based on the findings, I did not reject the null hypothesis.

Table 8

Logistic Regression: Consultation With a Mental Health Provider as a Predictor of Depression Screening

		B	*SE*	Wald	*df*	Sig.	Odds ratio	95.0% CI for odds ratio	
								Lower	Upper
Step 1[a]	Mental health provider seen (1)	1.030	.748	1.895	1	.169	2.800	.646	12.127
	Constant	-3.227	.062	2724.002	1	.000	.040		

[a] Variable(s) entered on Step 1: Mental health provider seen.

Research Question 2

The second research question explored whether there is an association between time spent with the physician and screening for depression among patients with a diagnosis of cancer. Simple logistic regression was performed to assess the impact of time spent with the physician among patients diagnosed with cancer on the likelihood that they had a screening for depression completed during that physician's office visit. The full model containing time spent with the physician as a predictor was not statistically significant, χ^2 (1, N=7146) = 2.061, p=0.151, indicating that the model was not significantly better than the baseline model (i.e., the result of the analysis with only the dependent variable). The model as a whole explained between 0.0% (Cox and Snell R square) and 0.00% (Nagelkerke R squared) of the variance in depression screening and correctly classified 92.2% of cases. Table 9 shows that "time spent with the physician" failed to make a unique statistically significant contribution to the model. The odds ratio was 1.006. This implies that for every unit increase in time spent with a physician during

an ambulatory visit, the odds of screening for depression increased by 0.6%. This relationship was not statistically significant, as evidenced by a 95% CI that ranged between 0.998 and 1.014. Based on the findings, I did not reject the null hypothesis.

Table 9

Logistic Regression: Time Spent With Physician as a Predictor of Depression Screening

		B	*SE*	Wald	*df*	Sig.	Odds ratio	95.0% CI for odds ratio	
								Lower	Upper
Step 1[a]	Time spent with physician in minutes	.006	.004	2.177	1	.140	1.006	.998	1.014
	Constant	-3.362	.115	850.706	1	.000	.035		

[a] Variable(s) entered on Step 1: Time spent with physician in minutes.

Research Question 3

The third research question explored whether there is an association between patient gender and screening for depression among patients with a diagnosis of cancer. Simple logistic regression was performed to assess the impact of gender among patients diagnosed with cancer on the likelihood that they were screened for depression. The full model containing gender as the predictor was statistically significant χ^2 (1, N=7146) = 5.265, p = 0.02, indicating that the model could distinguish between patients who had a screening for depression and those that did not. The model explained between 0.1% (Cox and Snell R square) and 0.3% (Nagelkerke R squared) of the variance in depression screening and correctly classified 96.2% of cases. As shown in Table 10, gender made a unique, statistically significant contribution to the model. The odds ratio of 1.328 implies that female cancer patients were 1.3 times as likely to report screening for depression as

their male counterparts. This finding was statistically significant (p = 0.02, odds ratio=1.328, CI=1.041-1.693). Based on the findings, the null hypothesis was rejected.

Table 10

Logistic Regression: Gender as a Predictor of Depression Screening

		B	*SE*	Wald	*df*	Sig.	Odds ratio	95.0% CI for odds ratio	
								Lower	Upper
Step 1[a]	Patient sex(1)	.284	.124	5.227	1	.022	1.328	1.041	1.693
	Constant	-3.370	.092	1328.853	1	.000	.034		

[a] Variable(s) entered on Step 1: Patient sex.

Research Question 4

The fourth research question explored whether there was an association between patient age and screening for depression among patients with a diagnosis of cancer. Simple logistic regression was performed to assess the impact of patient age among patients with a cancer diagnosis on the likelihood of being provided with screening for depression. The full model containing age as a predictor was not statistically significant χ^2 (4, N=7146) = 3.789, p = 0.435, indicating that the model was not significantly better than the baseline model (i.e., the result of the analysis with only the dependent variable). The model explained only between 0.1% (Cox and Snell R square) and 0.2% (Nagelkerke R squared) of the variance in depression screening and correctly classified 96.2% of cases. Table 11 shows that none of the age groups were significant predictors of screening for depression. Based on the findings, the null hypothesis was not rejected.

Table 11

Logistic Regression Showing Age as a Predictor of Depression Screening

		B	*SE*	Wald	*df*	Sig.	Odds ratio	95.0% CI for odds ratio	
								Lower	Upper
Step 1[a]	Age group			3.862	4	.425			
	Age Group(1)	.387	1.049	.136	1	.712	1.473	.189	11.509
	Age Group(2)	.086	1.025	.007	1	.933	1.089	.146	8.119
	Age Group(3)	.280	1.023	.075	1	.784	1.323	.178	9.819
	Age Group(4)	.037	1.022	.001	1	.971	1.038	.140	7.696
	Constant	-3.367	1.017	10.961	1	.001	.034		

[a] Variable(s) entered on Step 1: Age group.

Research Question 5

The fifth research question explored whether there was an association between patient race and screening for depression among patients with a diagnosis of cancer. Simple logistic regression was performed to assess the impact of race among patients with a cancer diagnosis on the likelihood of being provided with screening for depression. The full model containing race as a predictor was not statistically significant χ^2 (3, N=7146) = 2.574, p = 0.462, indicating that the model was not significantly better than the baseline model (i.e., the result of the analysis with only the dependent variable). The model explained between 0.0% (Cox and Snell R square) and 0.01% (Nagelkerke R squared) of the variance in depression screening and correctly classified 96.2% of cases. Table 12 shows that none of the racial groups were significant predictors of screening for depression. Based on the findings, I did not reject the null hypothesis.

Table 12

Logistic Regression Showing Race as a Predictor of Depression Screening

		B	*SE*	Wald	*df*	Sig.	Odds ratio	95.0% CI for odds ratio	
								Lower	Upper
Step 1[a]	Race/ethnicity—Imputed			2.773	3	.428			
	Race/ethnicity—Imputed(1)	-.167	.280	.356	1	.551	.846	.489	1.464
	Race/ethnicity—Imputed(2)	.371	.245	2.286	1	.131	1.449	.896	2.342
	Race/ethnicity—Imputed(3)	-.004	.421	.000	1	.992	.996	.436	2.274
	Constant	-3.234	.067	2365.024	1	.000	.039		

[a] Variable(s) entered on Step 1: Race/ethnicity—Imputed.

Research Question 6

The sixth research question explored whether there was an association between physician specialty and screening for depression among patients with a diagnosis of cancer. Simple logistic regression was performed to assess the impact of physician specialty among patients with a cancer diagnosis on the likelihood of being screened for depression. The model contained one predictor variable (physician specialty). The full model containing the predictor variable was statistically significant χ^2 (13, N=7146) = 161.273, $p < .001$, indicating that the model was able to distinguish between patients who had a screening for depression and those that did not. The model explained between 2.2% (Cox and Snell R square) and 8.0% (Nagelkerke R squared) of the variance in depression screening and correctly classified 96.2% of cases. Table 13 shows that physician

specialty was significantly associated with receipt of depression screening. The odds of receiving screening for depression were higher among patients that saw their primary care physicians than among patients that saw their physicians in general surgery, orthopedic surgery, cardiovascular disease, dermatology, urology, ophthalmology, and otolaryngology, and others (p <0.01).

Table 13

Logistic Regression Showing Physician Specialty as a Predictor of Depression Screening

		B	*SE*	Wald	*df*	Sig.	Odds ratio	95.0% CI for odds ratio	
								Lower	Upper
Step 1[a]	Physician specialty—14 groups			114.790	13	.000			
	Physician specialty—14 groups (internal medicine)	.025	.231	.012	1	.914	1.025	.651	1.614
	Physician specialty—14 groups (pediatrics)	-.043	.753	.003	1	.955	.958	.219	4.191
	Physician specialty—14 groups (general surgery)	-1.093	.303	12.990	1	.000	.335	.185	.607
	Physician specialty—14 groups (obstetrics and gynecology)	-.472	.375	1.583	1	.208	.624	.299	1.301
	Physician specialty—14 groups (orthopedic surgery)	-1.703	.527	10.455	1	.001	.182	.065	.511
	Physician specialty—14 groups (cardiovascular disease)	-1.496	.477	9.848	1	.002	.224	.088	.570
	Physician specialty—14 groups (dermatology)	-2.847	.437	42.498	1	.000	.058	.025	.137
	Physician specialty—14 groups (urology)	-1.268	.247	26.256	1	.000	.282	.173	.457
	Physician specialty—14 groups (psychiatry)	.718	.414	3.007	1	.083	2.050	.911	4.617
	Physician specialty—14 groups (neurology)	-.215	.377	.325	1	.569	.806	.385	1.690
	Physician specialty—14 groups (ophthalmology)	-2.804	.725	14.951	1	.000	.061	.015	.251
	Physician specialty—14 groups (otolaryngology)	-1.877	.475	15.587	1	.000	.153	.060	.389

	Physician specialty—14 groups (other specialties)	-.453	.184	6.065	1	.014	.635	.443	.912
	Constant	-2.400	.152	248.164	1	.000	.091		

[a] Variable(s) entered on Step 1: Physician specialty—14 groups.

Additional Analyses

Additional analyses were performed to characterize and explore potential predictors of depression screening among patients diagnosed with cancer. Another rationale for including these analyses was based on the increasing evidence that physicians' region of practice appeared to contribute as an important determinant of health care services provision (Bhattacharjee et al., 2018; Harrison et al., 2010). These analyses, though not defined *a priori*, are included in this section. Specifically, an additional analysis was performed to investigate the relationship between the region where physicians' visits occurred, and the probability of screening for depression. The variable consisted of four categories, including Northeast, Midwest, South, and West. Table 14 depicts the frequencies and percentages of the regions where most physicians' sampled visits occurred. Most visits occurred in the Midwest and South, accounting for 30.8% and 31.9%, respectively, of the total visits.

Table 14

Frequencies and Percentages of Geographic Region

Geographic region	Frequency	Percent
Northeast	1014	14.2
Midwest	2199	30.8
South	2278	31.9
West	1655	23.2

	Total	7146	100.0

Simple logistic regression was performed to assess whether region was a predictor of depression screening. The full model containing region as a predictor was statistically significant χ^2 (3, N=7146) = 11.533, p = 0.009, indicating that the model was able to distinguish between patients who received and those who did not receive screening for depression. The model explained between 0.2% (Cox and Snell R square) and 0.6% (Nagelkerke R squared) of the variance in depression screening and correctly classified 96.2% of cases. Table 15 shows that cancer patients who had physician visits in the Northeast region were approximately twice as likely to be screened for depression as those having visits in the Midwest (OR=2.074, CI=1.311-3.283, *P*=.002), 1.8 times as likely to be screened for depression as those having visits in the West (OR=1.818, CI=1.125-2.939, *P*=.002), and 1.6 times as likely to be screened for depression as those having visits in the South.

Table 15

Logistic Regression Showing Region as a Predictor of Depression Screening

		B	*SE*	Wald	*df*	Sig.	Odds ratio	95% CI for odds ratio	
								Lower	Upper
Step 1[a]	Region where majority of physician's sampled visits occurred			10.325	3	.016			
	Region where physicians' visits occurred (Midwest)	.730	.234	9.702	1	.002	2.074	1.311	3.283

Region where physician's visits occurred (South)	.488	.239	4.181	1	.041	1.629	1.020	2.601
Region where physician's visits occurred (West)	.598	.245	5.950	1	.015	1.818	1.125	2.939
Constant	-3.763	.211	318.334	1	.000	.023		

[a] Variable(s) entered on Step 1: Region where majority of physician's sampled visits occurred.

Additionally, multivariate logistic regression was performed. The findings were consistent with the univariate analyses in which physician specialty and geographical region where physician visits occurred were significantly associated with receipt of depression screening. However, when the other variables were controlled for, gender, which was a statistically significant predictor of depression screening among cancer patients on its own, was no longer significant, implying a potential confounder interaction (OR=1.048, CI=0.803-1.368, *P*=.729).

Table 16

Multivariate Logistic Regression Predicting Likelihood of Receipt of Depression

		B	*SE*	Wald	*df*	Sig.	Odds ratio	95.0% CI for odds ratio	
								Lower	Upper
Step 1[a]	Mental health provider seen (1)	.064	.781	.007	1	.934	1.066	.231	4.931
	Time spent with physician in minutes	.000	.004	.007	1	.933	1.000	.992	1.009
	Patient sex (1)	.126	.134	.878	1	.349	1.134	.872	1.476
	Age group			3.382	4	.496			
	Age Group (1)	.546	1.102	.245	1	.620	1.726	.199	14.956
	Age Group (2)	.295	1.079	.075	1	.785	1.343	.162	11.140
	Age Group (3)	.571	1.077	.281	1	.596	1.770	.214	14.628
	Age Group (4)	.386	1.078	.128	1	.720	1.471	.178	12.170
	Race/ethnicity—Imputed			3.921	3	.270			
	Race/ethnicity—Imputed (1)	-.318	.285	1.244	1	.265	.728	.416	1.272
	Race/ethnicity—Imputed (2)	.382	.253	2.287	1	.130	1.466	.893	2.406
	Race/ethnicity—Imputed (3)	-.126	.429	.087	1	.768	.881	.380	2.042
	Physician specialty—14 groups			111.838	13	.000			
	Physician specialty—14 groups (1)	.110	.235	.218	1	.641	1.116	.705	1.767
	Physician specialty—14 groups (2)	.099	.790	.016	1	.900	1.105	.235	5.197
	Physician specialty—14 groups (3)	-1.115	.306	13.296	1	.000	.328	.180	.597
	Physician specialty—14 groups (4)	-.458	.385	1.413	1	.235	.633	.298	1.346
	Physician specialty—14 groups (5)	-1.626	.528	9.486	1	.002	.197	.070	.554
	Physician specialty—14 groups (6)	-1.457	.478	9.288	1	.002	.233	.091	.594
	Physician specialty—14 groups (7)	-2.831	.438	41.867	1	.000	.059	.025	.139
	Physician specialty—14 groups (8)	-1.197	.254	22.177	1	.000	.302	.184	.497
	Physician specialty—14 groups (9)	.822	.437	3.543	1	.060	2.275	.967	5.352
	Physician specialty—14 groups (10)	-.203	.382	.281	1	.596	.817	.386	1.728
	Physician specialty - 14 groups(11)	-2.779	.726	14.642	1	.000	.062	.015	.258
	Physician specialty—14 groups (12)	-1.833	.477	14.781	1	.000	.160	.063	.407
	Physician specialty—14 groups (13)	-.429	.187	5.274	1	.022	.651	.452	.939
	Region where majority of physician's sampled visits occurred			12.084	3	.007			
	Region where majority of physician's sampled visits occurred (1)	.779	.239	10.599	1	.001	2.179	1.363	3.483
	Region where majority of physician's sampled visits occurred (2)	.478	.243	3.850	1	.050	1.612	1.001	2.598

	B	*SE*	Wald	*df*	Sig.	Odds ratio	95.0% CI for odds ratio	
							Lower	Upper
Region where majority of physician's sampled visits occurred (3)	.662	.249	7.076	1	.008	1.939	1.190	3.160
Constant	-3.509	1.121	9.804	1	.002	.030		

[a] Variable(s) entered on Step 1: Mental health provider seen, Time spent with physician in minutes, Patient sex, Age group, Race/ethnicity—imputed, Physician specialty, Region where majority of physician's sampled visits occurred.

Summary

Chapter 4 used the NAMCS dataset, which comprises a national probability sample of visits to the emergency and outpatient departments of noninstitutional general and short-stay hospitals, to evaluate the predictors of depression screening in patients diagnosed with cancer. The predictors included consultation with a mental health professional, time spent with the physician, patient gender, age, and race, and physician specialty. Even though the geographical region was not specified *a priori* as a predictor, it was nevertheless included in the final analyses. It was included to characterize and explore other potential predictors of depression screening among patients diagnosed with cancer.

The results of the data analyses were presented in this chapter. Both univariate and multivariate logistic regression were performed to characterize the predictors and appropriately analyze the data. The odds ratios, including the CI and statistical significance of the associations, were reported. Based on the simple logistic regression analyses, age, physician specialty, and geographical region of physician visits were found to be statistically significant predictors of receipt of depression screening among cancer patients attending ambulatory care settings. The results of the multivariate analysis were similar to those of the simple logistic regression analyses. However, when all the other

independent variables were controlled for in the model, the gender variable was no longer a statistically significant predictor of depression screening, thereby indicating a potential confounding effect.

Chapter 5 will discuss the interpretation of the results and the strengths and limitations of the study. The results will be discussed in the context of the current knowledge in the discipline by comparing the findings in this study with those in the recent literature . The chapter will end with recommendations for future research and the positive social significance of the main results of this research work.

Chapter 5: Discussion

Introduction

Cancer occurring comorbidly with depression continues to be a significant public health problem (Pule et al., 2019). Despite improved cancer outcomes associated with prompt and adequate treatment of depression in cancer, studies have shown that depression is underrecognized and undertreated among cancer patients. Several guidelines have recommended that cancer patients be routinely screened for depression. Therefore, this research determined and evaluated the predictors of depression screening among cancer patients in ambulatory care settings in the United States. The study explored the factors that predict depression screening for cancer patients in ambulatory settings. Sociodemographic factors, such as age, gender, and race, and other variables, such as physician specialty, time spent with the physician, and consultation with a mental health provider, were explored as potential predictor variables. The outcome variable was depression screening (yes/no). The study used a quantitative approach with a cross-sectional study design to determine if there were any relationships between the independent and dependent variables. Secondary data from the NAMCS, which comprises a national probability sample of visits to the emergency and outpatient departments of noninstitutional general and short-stay hospitals, were analyzed.

The NAMCS data are designed to meet the need for objective, reliable information about the provision and use of ambulatory medical care services in the United States. The database is open to the public and easily accessed by going to a website. The data were collected using surveys that captured physician-patient encounters

or clinic visits. These encounters could have involved direct or personal interaction between a patient and his or her physician or clinic staff working under the direct supervision of a physician.

This study was conducted to contribute to the body of literature on depression screening among cancer patients. My decision to conduct this study was based on the public health significance of depression occurring comorbidly with cancer. Increased knowledge of predictors of depression screening in cancer patients has the potential to translate to a higher rate of screening, thereby reducing underdiagnosis and undertreatment.

Interpretation of the Findings

This study is the first to explore the predictors of depression screening among cancer patients. Findings from this research show that out of the total 7,146 visits that met the inclusion criteria, 274 visits included depression screening. These data indicate that among patients with cancer attending ambulatory care clinics during the entire study period, approximately 3.8% of visits included depression screening. This shows that depression screening of cancer patients in the United States is not very common. Other key findings based on the simple logistic regression analyses in the current study were that gender, physician specialty, and the geographic region in which physician visits occurred were statistically significant predictors of receipt of depression screening among cancer patients attending ambulatory care settings. The result of the multivariate analysis was similar to the simple logistic regression. However, when the other independent variables were controlled for, the gender variable was no longer a statistically significant

predictor of depression screening, implying a potentially confounding effect.

The finding of a low depression screening rate among cancer patients in the current study is similar to findings of previous studies that explored the rate of depression screening among adults in ambulatory care settings in the United States (Bhattacharjee et al., 2018; Harrison et al., 2010). Possible reasons for the low rate of depression screening seen in the current study may be related to the evolution of guidelines and recommendations for depression screening. There has been a highly contentious debate on depression screening over the last three decades. Earlier recommendations had argued against routine screening in the ambulatory care setting, with later updates in 2002 and 2009 recommending screening adults for depression only when appropriate staff-assisted depression care supports are in place (USPSTF, 2002, 2009). Although the most recent updates to the USPSTF recommendations on depression screeing in 2016 omitted the requirement that screening only occur in the presence of enhanced services (Siu et al., 2016), it is essential to note that the data analyzed in this study were 2014–2016 NAMCS data. It is therefore possible that the previous restrictive guideline could have affected the general rate of depression screening, which may explain the relatively low depression screening rate reported in the current study.

Furthermore, uncertainty about the diagnosis of depression and subsequent treatment could have contributed to the low rate of depression screening reported in the current study. It is often challenging for physicians to differentiate between the “natural” unhappiness and anxiety that accompany terminal illness diagnoses such as cancer and pathological mood alterations. Complicating the uncertainty is the fact that it is not

unusual for some of the symptoms of both conditions to overlap. Over time, most healthcare providers dealing with comorbid conditions lose their self-efficacy about treating cancer patients with depression. They lose the belief that such treatments can make any difference in patient outcomes (Greenberg, 2004). Physicians often have limited time for extensive discussion with their patients about any ongoing emotional and psychological challenges. These limited interactions result in several missed opportunities to elicit depressive symptoms from patients and create the right conditions for physicians to avoid patients' questions about emotions. Patients who are afraid of being stigmatized also might refuse to volunteer information about their emotional predicaments. The combination of a physician who refuses to "ask" and a patient who refuses to "tell" makes depression screening very unlikely (Maguire, 1985).

Mental Health Provider

Both the simple logistic regression and the multivariable analysis did not detect any significant predictive association between seeing a mental health provider during visits and screening for depression. Qualified mental health providers play a pivotal role in diagnosing depression and linking patients to treatment. Indeed, studies have shown that depressed patients prefer that a mental health provider rather than a primary care physician provide evidence-based treatment for their depression (Van Voorhees et al., 2003). This implies that, contrary to this study's findings, one would expect that seeing a mental health provider during an ambulatory visit would be a predictor of receiving depression screening. One reason for the findings of the current study may be the low proportion of visits in which mental health providers were seen, representing only 0.3%

of the total visits included in the study. In essence, the result should not necessarily be interpreted as meaning that the mental health services offered by mental health providers are meaningless, but rather that there were insufficient visits with mental health providers to demonstrate any relationship. In the current study, out of the 7,146 visits included in the analysis, only 20 visits included visits to mental health providers. The disproportionately low number of visits with mental health providers may explain why there was no association between visits to a mental health provider and screening for depression.

Time Spent With Physician

Furthermore, time spent with the physician was not a significant predictor of depression screening. This may underscore the importance of differentiating between quality versus quantity of time spent with the physician. This finding implies that increasing the length of visits to a physician's office does not necessarily substitute for a qualitative physician office visit. Complex and dynamic physician-patient interactions, including time spent gathering a patient's history, establishing a relationship, and engaging in administrative work, contribute to the time that a physician spends with patients (Dugdale et al., 1999). Typically, the physician's workload does not allow enough time to navigate all of these complex interactions. Therefore, even when the time for physician-patient interaction increases, there are multiple activities that may occur during this time, and screening for depression is not necessarily among them.

Gender

This study found that females were more likely to be screened for depression than

males in the simple logistic regression analysis. This was in keeping with a higher incidence of depression among females in the general population. However, some prevalence research studies on gender differences in cancer occurring comorbidly with depression have, for the most part, yielded conflicting results (Miaskowski, 2004). For example, some studies have found that the gender difference in the depression incidence rate among the general population is reversed among cancer patients, with depression occurring more in men, and men with cancer reporting more depression symptoms than women with cancer (Pudrovska, 2010). Other investigators have reported that depressed women are more likely than depressed men to present with psychiatric and medical comorbidity, including cancer (de Leeuw et al., 2001; Hopwood & Stephens, 2000; Sloan & Sandt, 2006). The finding that females demonstrated significantly higher odds of depression screening than their male counterparts is similar to previous studies (Bhattacharjee et al., 2018; Harrison et al., 2010). This variation may well imply that the lower prevalence rates of depression seen in male cancer patients may be driven by underdiagnosis due to a lower screening rate.

This finding underscores the importance of driving awareness campaigns and educating male cancer patients about depression, screening for depression, and engagement in early treatment as appropriate. This is particularly important in that cancer has more adverse psychological implications for men than for women (Pudrovska, 2010). Physicians should also be aware of the need to actively pursue depression screening for male cancer patients.

Age

Although studies have shown that depression tends to vary with age, this study showed that age did not significantly predict depression screening among cancer patients. The result showing that age was not a significant predictor of depression screening among cancer patients was the same for the multivariable analysis. While studies have shown that cancer and mental health comorbidities are associated with poorer outcomes, studies have also shown that the age of patients with comorbidities is not a driver of poorer outcomes and not a predictor of clinical response (Angstman et al., 2011). This may explain why age was not a significant predictor of depression screening among the patient population. If age is not related to patient outcome, then there may not be any motivation to screen patients for depression based on their age alone.

Race

Concerning the fifth research question, results showed that race was not a significant predictor of screening for depression among cancer patients. Based on the data analyzed, the total sample of those screened for depression across the different racial groups was small. Additionally, there was disproportionate representation of the different racial groups in the study, with non-Hispanic Whites heavily and disproportionately represented compared to the other racial groups. This may have been responsible for the nonsignificant association found in the data.

Region

The current study demonstrated that cancer patients who had physician visits in the Northeast region were more likely to be screened for depression than those having

physician visits in the other geographic regions of the United States. This finding is in keeping with previous research (Bhattacharjee et al., 2018; Harrison et al., 2010). This may be a result of disparities in the physician workforce across the country. Based on the current projection, the South and West regions are expected to continue to see more physician workforce shortages than the Northeast (Zhang et al., 2020). Other reasons for these findings may involve the geographic distribution of physicians across the four U.S. Census Bureau regions. Residents of metropolitan areas such as those of the Northeast have better geographic access to physicians, whereas residents of isolated rural counties have less access (Rosenthal et al., 2005). This research underscores the need to create enabling environments that can improve the awareness of depression screening, especially in regions outside the Northeast.

Physician Specialty

The current study showed that the odds of screening for depression were significantly higher during a visit to a primary care physician than to physicians of other specialties. Different guidelines recommend that the general adult population be screened for depression with the primary care physician designated as the primary focus for screening for depression. For example, the American College of Preventive Medicine (ACPM) emphasizes the primary care physician as the care provider to screen for depression. Specifically, the ACPM recommends that the primary care physician screen all adults for depression, and that there should be systems in place, either within the primary care setting itself or through collaborations with mental health professionals, to ensure the accurate diagnosis and treatment of depression (Nimalasuriya et al., 2009).

As a generalization, most patients with depression, including cancer patients with comorbid depression, will receive their depression care in the primary care setting. There is evidence that patients with comorbid depression are more likely to contact a primary care provider than providers in other specialties (Akincigil & Matthews, 2017). This study's results go further to emphasize the pivotal role that primary care physicians play in ensuring prompt diagnosis and adequate follow-up treatment for cancer patients with depression. Lo and colleagues (2013) explored how depression affected health care service utilization in patients diagnosed with cancer. They reported that patients with depression were more likely to visit primary care physicians but less likely to visit oncologists than cancer patients without depression (Lo et al., 2013). Therefore, all efforts must be made to ensure that primary care physicians continue to have all they require to continue to provide depression screening for the cancer population.

Limitations

The current study had some limitations, and as a result, findings from this research work should be interpreted with caution. First, this study's cross-sectional design implies that both the predictors and the outcome variable were simultaneously assessed and does not allow for causal inference. Further, the fact that a patient was not screened for depression during a particular visit does not mean that the patient was not screened by some other means. Additionally, the dataset did not identify any specific depression screening type or procedure used by physicians. This makes it difficult to understand how the different physicians defined depression screening. The implication is that depression screening methods may have varied widely from one physician to another. While some

providers may have adopted a particular type of screening criteria, others may have used different screening criteria.

Another limitation of the current study related to the NAMCS data is that depression screening was explored based on patient visits. It is quite possible that different estimates might have been derived if the predictors of depression screening had been explored using individual patients as the unit of analysis instead of physician visits. The relatively low proportion of some of the variables may mean that there were not enough data to demonstrate whether there was any effect. For example, the proportion of visits that included seeing a mental health provider was very low. While there was no significant relationship between seeing a mental health provider and depression screening, it is difficult to conclude that the services provided by the mental health providers were not clinically significant. Finally, given that secondary data were used, it is not possible to conveniently rule out potential data collection errors, data entry errors, and data reporting errors.

Recommendations

In the current study, I focused primarily on the predictors of depression screening among cancer patients. There were a number of reasons for this focus, including the dearth of literature in the field of predictors of depression screening among cancer patients, the public health significance of depression occurring comorbidly with cancer, and the potential that the knowledge of predictors of depression screening in cancer patients may translate to a higher rate of screening, thereby reducing underdiagnosis and undertreatment. As mentioned above, this study used a cross-sectional design, which

precludes the possibility of making any causal inference. Future research should use other study designs where patients are followed up until the desired outcome of interest is observed or not observed. This type of study design can better establish a causal relationship. The NAMCS dataset used in this research did not specify the strategy used for depression screening; therefore, future research should improve on this by defining and standardizing depression screening methods across all patients and physician visits. Future research should also use patients as the unit of analysis rather than physician visits.

Furthermore, in the current study, I explored the predictors of depression screening among cancer patients in general. Potentially, different cancer types, including anatomic location and histology, may have different predictors for depression screening.. Therefore, future studies should seek to explore the predictors of depression screening in different cancer types.

Implications

The results of the current study can potentially influence positive social change at both the individual and organizational levels. The findings can also inform policy changes that can impact screening guidelines at the societal level. From the study, gender was a predictor of screening for depression among cancer patients, with females having a higher probability of being screened. This knowledge presents an opportunity for a targeted educational strategy among male cancer patients to increase the awareness of depression co-occurring with cancer and engage their physicians on the need to screen proactively.

Additionally, this research showed that a visit to a primary care physician is more likely to result in screening for depression among cancer patients compared to other physician specialists. This is in keeping with most guidelines for depression screening in which primary care physicians are the primary drivers of depression screening. While the current study can encourage the continuous provision of incentives to strengthen proactive screening for depression among cancer patients by primary care physicians, guidelines and policies can be updated to ensure proper training for other specialists to reduce the many missed opportunities for depression screening. Overall, the current study can contribute to society by stimulating new approaches to recognizing and managing patients with comorbid conditions and informing public debates, policy-making strategies, and screening guidelines.

Conclusion

The current study explored the predictors of depression screening among cancer patients in the ambulatory care setting in the United States. While depression screening is a crucial first step in diagnosing depression among cancer patients and connecting patients to the treatment they need, the current study found that the depression screening rate among cancer patients is extremely low in the U.S ambulatory care setting (3.8%). The current study found patient gender, physician specialty, and geographic region to be statistically significant predictors of depression screening among cancer patients. Based on these findings, routine depression screening rates among cancer patients can be improved by targeting interventions, especially at male patients, and improving physicians' training so they can gain competence in screening for depression. The results

also suggest an opportunity for creating an enabling environment that can enhance the awareness of depression screening in the West, South, and Midwest geographic region of the U.S.

References

Abid, G., Kehyayan, V., & Johnson, J. (2018). Depression screening in cancer patients: A narrative review. *Journal of Nursing Education and Practice*, *8*(11), 11-15. https://doi.org/10.5430/jnep.v8n11p11

Agapidaki, E., Souliotis, K., Christogiorgos, S., Zervas, I., Leonardou, A., Kolaitis, G., Giannakopoulos, G., Dimitrakaki, C., & Tountas, Y. (2013). A theory-based educational intervention to pediatricians in order to improve identification and referral of maternal depression: A quasi-experimental study. *Annals of General Psychiatry*, *12*(1), 37–46.

Akincigil, A., & Matthews, E. B. (2017). National rates and patterns of depression screening in primary care: Results from 2012 and 2013. *Psychiatric Services*, *68*(7), 660–666. https://doi.org/10.1176/appi.ps.201600096

Alderson, P. (1998). The importance of theories in health care. *BMJ*, *317*(7164), 1007–1010.

Alemayehu, M., Deyessa, N., Medihin, G., & Fekadu, A. (2018). A descriptive analysis of depression and pain complaints among patients with cancer in a low-income country. *PLoS ONE*, *13*(3), 1–14.

Alison, Z., Rob, S.-F., Amy, W., Mariko, C., Allison W. B., & Anthony, P. (2016). Does screening for physical and psychosocial symptoms vary between medical oncology treatment centres? *Psycho-Oncology*, *25*(5), 521–528.

Allemani, C., Matsuda, T., Di Carlo, V., Harewood, R., Matz, M., Nikšić, M., Bonaventure, A., Valkov, M., Johnson, C. J., Estève, J., Ogunbiyi, O. J., Azevedo

E Silva, G., Chen, W. Q., Eser, S., Engholm, G., Stiller, C. A., Monnereau, A., Woods, R. R., Visser, O., Lim, G. H., … CONCORD Working Group. (2018). Global surveillance of trends in cancer survival 2000-14 (CONCORD-3): Analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries. *Lancet*, *391*(10125), 1023–1075. https://doi.org/10.1016/S0140-6736(17)33326-3

American Cancer Society. (2020). *Cancer facts and figures 2020*. https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2020.html

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

Angstman, K. B., MacLaughlin, K. L., Rasmussen, N. H., DeJesus, R. S., & Katzelnick, D. J. (2011). Age of depressed patient does not affect clinical outcome in collaborative care management. *Postgraduate Medicine*, *123*(5), 122–128. https://doi.org/10.3810/pgm.2011.09.2467

Arem, H., & Loftfield, E. (2017). Cancer epidemiology: A survey of modifiable risk factors for prevention and survivorship. *American Journal of Lifestyle Medicine*, *12*(3), 200–210. https://doi.org/10.1177/1559827617700600

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037//0033-295x.84.2.191

Baxter, A. J., Scott, K. M., Ferrari, A. J., Norman, R. E., Vos, T., & Whiteford, H. A.

(2014). Challenging the myth of an "epidemic" of common mental disorders: Trends in the global prevalence of anxiety and depression between 1990 and 2010. *Depression and Anxiety*, *31*(6), 506–516. https://doi.org/10.1002/da.22230

Becker, M. H. (1974). The Health Belief Model and personal health behavior. *Health Education Monographs*, *2*, 324–508.

Bennett, D. A. (2001). How can I deal with missing data in my study? *Australian and New Zealand Journal of Public Health*, *25*(5), 464–469.

Bhattacharjee, S., Goldstone, L., Vadiei, N., Lee, J. K., & Burke, W. J. (2018). Depression screening patterns, predictors, and trends among adults without a depression diagnosis in ambulatory settings in the United States. *Psychiatric Services*, *10*, 1098.

Bornmann, L. (2012). Measuring the societal impact of research: Research is less and less assessed on scientific impact alone—We should aim to quantify the increasingly important contributions of science to society. *EMBO Reports*, *13*(8), 673–676. doi:10.1038/embor.2012.99

Boslaugh, S. E. (2013). Health belief model. *Salem Press Encyclopedia*.

Brugha, T. S., Jenkins, R., Taub, N., Meltzer, H., & Bebbington, P. E. (2001). A general population comparison of the Composite International Diagnostic Interview (CIDI) and the Schedules for Clinical Assessment in Neuropsychiatry (SCAN). *Psychological Medicine*, *31*(6), 1001–1013. https://doi.org/10.1017/s0033291701004184

Carrera-Lasfuentes, P., Abad, J. M., Aguilar-Palacio, I., & Rabanaque, M. J. (2015).

Comorbilidad como predictor de utilización de servicios sanitarios y mortalidad en pacientes con diabetes [Comorbidity as a predictor of health services utilization and mortality in patients with diabetes]. *Gaceta Sanitaria*, *29*(1), 10–14. https://doi.org/10.1016/j.gaceta.2014.07.008

Caruso, R., GiuliaNanni, M., Riba, M. B., Sabato, S., & Grassi, L. (2017). Depressive spectrum disorders in cancer: Diagnostic issues and intervention. A critical review. *Current Psychiatry Reports*, *19*(6), 33. https://doi.org/10.1007/s11920-017-0785-7

Champion, V., & Skinner, C.S. (2008). The health belief model. In: Glanz, K., Rimer, B., Viswanath, K., editors. Health behavior and health education. 4. San Francisco, CA: Jossey-Bass; 2008. pp. 45–65.

Cheng, H. G., & Phillips, M. R. (2014). Secondary analysis of existing data: opportunities and implementation. *Shanghai Archives of Psychiatry*, *26*(6), 371–375. https://doi.org/10.11919/j.issn.1002-0829.214171

Chou, P. C., Chao, Y. M., Yang, H. J., Yeh, G. L., & Lee, T. S. (2011). Relationships between stress, coping and depressive symptoms among overseas university preparatory Chinese students: A cross-sectional study. *BMC Public Health*, *11*, 352. https://doi.org/10.1186/1471-2458-11-352

Choudhry, F. R., Mani, V., Ming, L. C., & Khan, T. M. (2016). Beliefs and perception about mental health issues: a meta-synthesis. *Neuropsychiatric Disease and Treatment*, *12*, 2807–2818. https://doi.org/10.2147/NDT.S111543

Clinton-McHarg, T., Carey, M., Sanson-Fisher, R., Tzelepis, F., Bryant, J., &

Williamson, A. (2014). Anxiety and depression among haematological cancer patients attending treatment centres: Prevalence and predictors. *Journal of Affective Disorders*, *165*, 176–181.

Commission on Chronic Illness (1957) Chronic Illness in the United States, Vol. I, Prevention of Chronic Illness, Cambridge, Mass.; Harvard University Press, Chapter 5, p. 45

Cronin, K. A., Lake, A. J., Scott, S., Sherman, R. L., Noone, A. M., Howlader, N., Henley, S. J., Anderson, R. N., Firth, A. U., Ma, J., Kohler, B. A., & Jemal, A. (2018). Annual report to the nation on the status of cancer, part I: National cancer statistics. *Cancer*, *124*(13), 2785–2800. https://doi.org/10.1002/cncr.31551

Cull, A., Cowie, V. J., Farquharson, D. I., Livingstone, J. R., Smart, G. E., & Elton, R. A. (1993). Early stage cervical cancer: Psychosocial and sexual outcomes of treatment. *British Journal of Cancer*, *68*(6), 1216–1220. https://doi.org/10.1038/bjc.1993.507

de Leeuw, J. R., de Graeff, A., Ros, W. J., Blijham, G. H., Hordijk, G. J., & Winnubst, J. A. (2001). Prediction of depression 6 months to 3 years after treatment of head and neck cancer. *Head & Neck*, *23*(10), 892–898. https://doi.org/10.1002/hed.1129

Desai, M. M., Rosenheck, R. A., & Craig, T. J. (2006). Case-finding for depression among medical outpatients in the Veterans Health Administration. *Medical Care*, *44*(2), 175–181. https://doi.org/10.1097/01.mlr.0000196962.97345.21

D'Souza, M. J., Li, R. C., Gannon, M. L., & Wentzien, D. E. (2019). 1997-2017 Leading

causes of death information due to diabetes, neoplasms, and diseases of the circulatory system, issues cautionary weight-related lesson to the U.S. population at large. *IEEE network*, *2019*, 1–6. https://doi.org/10.1109/ICESI.2019.8863033

Dugdale, D. C., Epstein, R., & Pantilat, S. Z. (1999). Time and the patient-physician relationship. *Journal of General Internal Medicine*, *14 Suppl 1*(Suppl 1), S34–S40. https://doi.org/10.1046/j.1525-1497.1999.00263.x

Duval, F., Lebowitz, B. D., & Macher, J. P. (2006). Treatments in depression. *Dialogues in Clinical Neuroscience*, *8*(2), 191–206.

Elias, N., Bou-Orm, I. R., & Adib, S. M. (2016). Patterns and determinants of mammography screening in Lebanese women. *Preventive Medicine Reports*, *5*, 187–193. https://doi.org/10.1016/j.pmedr.2016.12.015

Enns, A., Waller, A., Groff, S. L., Bultz, B. D., Fung, T., & Carlson, L. E. (2013). Risk factors for continuous distress over a 12-month period in newly diagnosed cancer outpatients. *Journal of Psychosocial Oncology*, *31*(5), 489–506.

Farr, S. L., Dietz, P. M., Williams, J. R., Gibbs, F. A., & Tregear, S. (2011). Depression screening and treatment among nonpregnant women of reproductive age in the United States, 1990-2010. *Preventing Chronic Disease*, *8*(6), A122.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*, 1149-1160.

Friedrich M. J. (2017). Depression is the leading cause of disability around the world. *JAMA*, *317*(15), 1517. https://doi.org/10.1001/jama.2017.3826

GBD (2015). Disease and injury incidence and prevalence collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: A systematic analysis for the Global Burden of Disease Study 2015 [published correction appears in Lancet. 2017 Jan 7;389(10064):e1]. *Lancet*. 2016;388(10053):1545-1602. doi:10.1016/S0140-6736(16)31678-6

Gilchrist, V. J., Stange, K. C., Flocke, S. A., McCord, G., & Bourguet, C. C. (2004). A comparison of the National Ambulatory Medical Care Survey (NAMCS) measurement approach with direct observation of outpatient visits. *Medical Care*, *42*(3), 276–280. https://doi.org/10.1097/01.mlr.0000114916.95639.af

Glanz, K., & Bishop, D. B. (2010). The role of behavioral science theory in development and implementation of public health interventions. *Annual Review of Public Health*, *31*, 399–418. https://doi.org/10.1146/annurev.publhealth.012809.103604

Glasser, S., Levinson, D., Bina, R., Munitz, H., Horev, Z., & Kaplan, G. (2016). Primary care physicians' attitudes toward postpartum depression: Is it part of their job?. *Journal of Primary Care & Community Health*, *7*(1), 24–29. https://doi.org/10.1177/2150131915611827

Godding, P. R., McAnulty, R. D., Wittrock, D. A., Britt, D. M., & Khansur, T. (1995). Predictors of depression among male cancer patients. *The Journal of Nervous and Mental Disease*, *183*(2), 95–98.

Grassi, L., Nanni, M.G., & Caruso, R. (2010). Emotional distress in cancer: Screening policy, clinical limitations, and educational needs. *Journal of Medicine and the*

Person. 8:51–9.

Greenberg, D. B. (2004). Barriers to the treatment of depression in cancer patients. *Journal of the National Cancer Institute. Monographs*, *32*, 127–135.

Hae-Ra, H., Yun Jung, C., Miyong T., K., Jong Eun, L., & Kim B., K. (2008). Experiences and challenges of informal caregiving for Korean immigrants. *Journal of Advanced Nursing*, *5*, 517.

Hahm, H. C., Cook, B. L., Ault-Brutus, A., & Alegría, M. (2015). Intersection of race-ethnicity and gender in depression care: screening, access, and minimally adequate treatment. *Psychiatric Services*, *66*(3), 258–264. https://doi.org/10.1176/appi.ps.201400116

Hansotte, E., Payne, S. I., & Babich, S. M. (2017). Positive postpartum depression screening practices and subsequent mental health treatment for low-income women in Western countries: A systematic literature review. *Public Health Reviews (2107-6952)*, *38*(1), 1–17.

Harrison, D. L., Miller, M. J., Schmitt, M. R., & Touchet, B. K. (2010). Variations in the probability of depression screening at community-based physician practice visits. *Primary Care Companion to the Journal of Clinical Psychiatry*, *12*(5), PCC.09m00911. https://doi.org/10.4088/PCC.09m00911blu

Heneghan, A. M., Chaudron, L. H., Storfer-Isser, A., Park, E. R., Kelleher, K. J., Stein, R. E. K., Hoagwood, K. E., O' Connor, K. G., & Horwitz, S. M. (2007). Factors associated with identification and management of maternal depression by pediatricians. *Pediatrics*, *3*, 444.

Henley, S. J., Ward, E. M., Scott, S., Ma, J., Anderson, R. N., Firth, A. U., Thomas, C. C., Islami, F., Weir, H. K., Lewis, D. R., Sherman, R. L., Wu, M., Benard, V. B., Richardson, L. C., Jemal, A., Cronin, K., & Kohler, B. A. (2020). Annual report to the nation on the status of cancer, part I: National cancer statistics. *Cancer*, *126*(10), 2225–2249. https://doi.org/10.1002/cncr.32802

Hickey, G. L., Grant, S. W., Dunning, J., & Siepe, M. (2018). Statistical primer: Sample size and power calculations-why, when and how?. *European Journal of Cardio-Thoracic Surgery* , *54*(1), 4–9. https://doi.org/10.1093/ejcts/ezy169

Hopko, D. R., Cannity, K., McIndoo, C. C., File, A. A., Ryba, M. M., Clark, C. G., & Bell, J. L. (2015). Behavior therapy for depressed breast cancer patients: predictors of treatment outcome. *Journal of Consulting and Clinical Psychology*, *83*(1), 225–231. https://doi.org/10.1037/a0037704

Hopwood, P., & Stephens, R. J. (2000). Depression in patients with lung cancer: prevalence and risk factors derived from quality-of-life data. *Journal of Clinical Oncology* , *18*(4), 893–903. https://doi.org/10.1200/JCO.2000.18.4.893

Horwitz, S. M., Kelleher, K. J., Stein, R. E., Storfer-Isser, A., Youngstrom, E. A., Park, E. R., Heneghan, A. M., Jensen, P. S., O'Connor, K. G., & Hoagwood, K. E. (2007). Barriers to the identification and management of psychosocial issues in children and maternal depression. *Pediatrics*, *119*(1), e208–e218. https://doi.org/10.1542/peds.2005-1997

Howell, D., Hack, T. F., Oliver, T. K., Chulak, T., Mayo, S., Aubin, M., Chasen, M., Earle, C. C., Friedman, A. J., Green, E., Jones, G. W., Jones, J. M., Parkinson, M.,

Payeur, N., Sabiston, C. M., & Sinclair, S. (2011). Survivorship services for adult cancer populations: A pan-Canadian guideline. *Current Oncology*, *18*(6), e265–e281. https://doi.org/10.3747/co.v18i6.956

Institute of Medicine. (2007). *Cancer care for the whole patient: Meeting psychosocial health needs—For health care providers*. National Academies Press. https://doi.org/10.17226/11993

Jacobsen, P. B., & Jim, H. S. (2008). Psychosocial interventions for anxiety and depression in adult cancer patients: Achievements and challenges. *CA: A Cancer Journal for Clinicians*, *58*(4), 214–230. https://doi.org/10.3322/CA.2008.0003

Jolles, M. P., Haynes-Maslow, L., Roberts, M. C., & Dusetzina, S. B. (2015). Mental health service use for adult patients with co-occurring depression and physical chronic health care needs, 2007-2010. *Medical Care*, *53*(8), 708–712.

Jones, C. L., Jensen, J. D., Scherr, C. L., Brown, N. R., Christy, K., & Weaver, J. (2015). The Health Belief Model as an explanatory framework in communication research: exploring parallel, serial, and moderated mediation. *Health Communication*, *30*(6), 566–576. https://doi.org/10.1080/10410236.2013.873363

Kang H. (2013). The prevention and handling of the missing data. *Korean Journal of Anesthesiology*, *64*(5), 402–406. doi:10.4097/kjae.2013.64.5.402

Katz, M. R., Kopek, N., Waldron, J., Devins, G. M., & Tomlinson, G. (2004). Screening for depression in head and neck cancer. *Psycho-Oncology*, *13*(4), 269–280.

Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Ustün, T. B. (2007). Age of onset of mental disorders: A review of recent literature. *Current*

Opinion in Psychiatry, *20*(4), 359–364. https://doi.org/10.1097/YCO.0b013e32816ebc8c

Kessler, R. C., & Bromet, E. J. (2013). The epidemiology of depression across cultures. *Annual Review of Public Health*, *34*, 119–138. https://doi.org/10.1146/annurev-publhealth-031912-114409

Kim, J., Youn, S., Choi, B., Jung, K. H., Ahn, S. D., Hwang, S. Y., Chung, S., & Lee, J. (2018). Psychological distress and drawing tests among women with breast cancer. *Journal of Korean Medical Science*, *33*(17), e140. https://doi.org/10.3346/jkms.2018.33.e140

Kim, J., Lim, S., Min, Y. H., Shin, Y. W., Lee, B., Sohn, G., Jung, K. H., Lee, J. H., Son, B. H., Ahn, S. H., Shin, S. Y., & Lee, J. W. (2016). Depression screening using daily mental-health ratings from a smartphone application for breast cancer patients. *Journal of Medical Internet Research*, *18*(8), e216. https://doi.org/10.2196/jmir.5598

Klügel S, Lücke C, Meta A, Schild-Suhren M, Malik E, Philipsen A, & Müller HHO. (2017). Concomitant psychiatric symptoms and impaired quality of life in women with cervical cancer: a critical review. *International Journal of Women's Health*, *ume 9*, 795–805.

Koroukian, S. M., & Sajatovic, M. (2017). Increased cancer-specific mortality in individuals developing mental disorders after cancer diagnosis: Biomedical factors versus psychosocial support. *Annals of Translational Medicine*, *5*(21), 432. https://doi.org/10.21037/atm.2017.08.37

Krebber, A. M., Buffart, L. M., Kleijn, G., Riepma, I. C., de Bree, R., Leemans, C. R., Becker, A., Brug, J., van Straten, A., Cuijpers, P., & Verdonck-de Leeuw, I. M. (2014). Prevalence of depression in cancer patients: A meta-analysis of diagnostic interviews and self-report instruments. *Psycho-Oncology*, *23*(2), 121–130. https://doi.org/10.1002/pon.3409

Kroenke, C. H., Kubzansky, L. D., Schernhammer, E. S., Holmes, M. D., & Kawachi, I. (2006). Social networks, social support, and survival after breast cancer diagnosis. *Journal of Clinical Oncology* 1105–1111. https://doi.org/10.1200/JCO.2005.04.2846

Kübler-Ross, Elisabeth. (1970, c1969) *On death and dying /*New York : Collier Books/Macmillan

Lau, K. L., Yim, P. H., & Cheung, E. Y. (2013). Psychiatric morbidity in Chinese women after cervical cancer treatment in a regional gynaecology clinic. *East Asian Archives of Psychiatry*, *23*(4), 144–153.

Larkin, D. R. (2020). Routine Depression Screenings for Advanced Cancer Patients: Reducing Disparities, Identifying Depression, and Improving Quality of Life. *Journal of Hospice & Palliative Nursing*, *22*(1), 12.

Lee, H. Y., Stange, M. J., & Ahluwalia, J. S. (2015). Breast cancer screening behaviors among korean american immigrant women: Findings from the health belief model. *Journal of Transcultural Nursing*, *26*(5), 450.

Lépine, J. P., & Briley, M. (2011). The increasing burden of depression. *Neuropsychiatric Disease and Treatment*, *7*(Suppl 1), 3–7.

https://doi.org/10.2147/NDT.S19617

Lim, G. Y., Tam, W. W., Lu, Y., Ho, C. S., Zhang, M. W., & Ho, R. C. (2018). Prevalence of depression in the community from 30 countries between 1994 and 2014. *Scientific Reports*, *8*(1), 2861. https://doi.org/10.1038/s41598-018-21243-x

Lima, M. P., Longatto-Filho, A., & Osório, F. L. (2016). predictor variables and screening protocol for depressive and anxiety disorders in cancer outpatients. *PloS One*, *11*(3), e0149421. https://doi.org/10.1371/journal.pone.0149421

Lin, P. H., Liu, J. M., Hsu, R. J., Chuang, H. C., Chang, S. W., Pang, S. T., Chang, Y. H., Chuang, C. K., & Lin, S. K. (2018). depression negatively impacts survival of patients with metastatic prostate cancer. *International Journal of Environmental Research and Public Health*, *15*(10), 2148.

Linden, W., Vodermaier, A., Mackenzie, R., & Greig, D. (2012). Anxiety and depression after cancer diagnosis: Prevalence rates by cancer type, gender, and age. *Journal of Affective Disorders*, *141*(2-3), 343–351. https://doi.org/10.1016/j.jad.2012.03.025

Lloyd-Williams M. (2003). Depression--the hidden symptom in advanced cancer. *Journal of the Royal Society of Medicine*, *96*(12), 577–581. https://doi.org/10.1258/jrsm.96.12.577

Love, A. W., Kissane, D. W., Bloch, S., & Clarke, D. (2002). Diagnostic efficiency of the Hospital Anxiety and Depression Scale in women with early stage breast cancer. *The Australian and New Zealand journal of psychiatry*, *36*(2), 246–250.

https://doi.org/10.1046/j.1440-1614.2002.01014.x

Maguire P. (1985). Improving the detection of psychiatric problems in cancer patients. *Social Science & Medicine (1982)*, *20*(8), 819–823. https://doi.org/10.1016/0277-9536(85)90336-3

Margari, N., Karapoulios, D., Getsios, I., Rizou, V., Kostopoulou, S., Balodimou, C., & Siagouli, M. (2016). Anxiety and depression in lung cancer patients. *International Journal of Caring Sciences*, *9*(1), 308–313.

Maxim, L. D., Niebo, R., & Utell, M. J. (2014). Screening tests: A review with examples. *Inhalation Toxicology*, *26*(13), 811–828. https://doi.org/10.3109/08958378.2014.955932

McNiff, K. K., Neuss, M. N., Jacobson, J. O., Eisenberg, P. D., Kadlubek, P., & Simone, J. V. (2008). Measuring supportive care in medical oncology practice: lessons learned from the quality oncology practice initiative. *Journal of Clinical Oncology* , *26*(23), 3832–3837. https://doi.org/10.1200/JCO.2008.16.8674

Meijer, A., Roseman, M., Milette, K., Coyne, J. C., Stefanek, M. E., Ziegelstein, R. C., Arthurs, E., Leavens, A., Palmer, S. C., Stewart, D. E., de Jonge, P., & Thombs, B. D. (2011). Depression screening and patient outcomes in cancer: A systematic review. *PLoS ONE*, *6*(11).

Miaskowski, C. (2004). Gender differences in pain, fatigue, and depression in patients with cancer. *Journal of the National Cancer Institute. Monographs*, *32*, 139–143.

Michael, A. (2007). Shorter oxford textbook of psychiatry, 5th edn. by M. gelder, P. harrison and P. cowen. (pp. 846; £49.95; ISBN 0198566670 pb.) oxford

university press: Oxford. 2006. *Psychological Medicine, 37*(2), 297-298

Mitchell, A. J., Kaar, S., Coggan, C., & Herdman, J. (2008). Acceptability of common screening methods used to detect distress and related mood disorders—preferences of cancer specialists and non-specialists. *Psycho-Oncology*, *17*(3), 226–236

Morrison AS. Screening in chronic disease. Oxford: University Press. 1992

Musuuza, J. S., Sherman, M. E., Knudsen, K. J., Sweeney, H. A., Tyler, C. V., & Koroukian, S. M. (2013). Analyzing excess mortality from cancer among individuals with mental illness. *Cancer*, *119*(13), 2469–2476. https://doi.org/10.1002/cncr.28091

National Center for Health Statistics (n.d.-a). *Ambulatory health care data*. https://www.cdc.gov/nchs/ahcd/index.htm?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fnchs%2Fahcd.htm

National Center for Health Statistics. (n.d.-b). *NAMCS data collection and processing*. https://www.cdc.gov/nchs/ahcd/ahcd_data_collection.htm#:~:text=Collection%20and%20Processing-,NAMCS%20Data%20Collection%20and%20Processing,performed%20by%20Census%20field%20representatives

National Center for Health Statistics. (2007). *NAMCS micro-data file documentation*.

National Center for Health Statistics. (2015). *NAMCS scope and sample design*. https://www.cdc.gov/nchs/ahcd/ahcd_scope.htm

National Center for Health Statistics. (2017a). *About the ambulatory health care surveys*.

http://www.cdc.gov/nchs/ahcd/about_ahcd.htm

National Center for Health Statistics (2017b). *Questionnaires, datasets, and related documents*. https://www.cdc.gov/nchs/ahcd/ahcd_questionnaires.htm

National Center for Health Statistics, E. Bryant and I. Shimizu. (1988). Sample design, sampling variance, and estimation procedures for the National Ambulatory Medical Care Survey. Vita/ and Health Statistics. Series 2, No. 108. DHHS Pub. No. (PHS) 88-1382. Public Health Service. Washington: U.S. Government Printing Office.

National Institutes of Health State-of-the-Science Conference Statement: Symptom Management in Cancer: Pain, Depression, and Fatigue, July 15–17, 2002. (2003). *Journal of the National Cancer Institute*, *15*, 1110.

NCCN practice guidelines for the management of psychosocial distress. National Comprehensive Cancer Network. *Oncology (Williston Park)*. 1999;13(5A):113-147.

Ng, C. W., How, C. H., & Ng, Y. P. (2016). Major depression in primary care: Making the diagnosis. *Singapore Medical Journal*, *57*(11), 591–597. https://doi.org/10.11622/smedj.2016174

Nick, T.G., & Campbell, K.M. (2007). Logistic regression. Methods Mol Biol. 2007; 404: 273–301. doi: 10.1007/978-1-59745-530-5_14

Nikbakhsh, N., Moudi, S., Abbasian, S., & Khafri, S. (2014). Prevalence of depression and anxiety among cancer patients. *Caspian journal of Internal Medicine*, *5*(3), 167–170.

Nimalasuriya, K., Compton, M. T., Guillory, V. J., & Prevention Practice Committee of the American College of Preventive Medicine (2009). Screening adults for depression in primary care: A position statement of the American College of Preventive Medicine. *The Journal of Family Practice*, *58*(10), 535–538

Opperman, K. J., Hanson, D. M., & Toro, P. A. (2017). Depression screening at a community health fair: Descriptives and treatment linkage. *Archives of Psychiatric Nursing*, *31*(4), 365–367

Orji, R., Vassileva, J., & Mandryk, R. (2012). Towards an effective health interventions design: an extension of the health belief model. *Online Journal of Public Health Informatics*, *4*(3), ojphi.v4i3.4321. https://doi.org/10.5210/ojphi.v4i3.4321

Pallant, J. (2010). SPSS survival manual: a step by step guide to data analysis using SPSS. Maidenhead: Open University Press/McGraw-Hill

Park, N. J., Chang, Y., Bender, C., Conley, Y., Chlebowski, R. T., van Londen, G. J., … Kuller, L. H. (2017). Cardiovascular disease and mortality after breast cancer in postmenopausal women: Results from the Women's Health Initiative. *PloS One*, *12*(9), e0184174. doi:10.1371/journal.pone.0184174

Pasquini, M., & Biondi, M. (2007). Depression in cancer patients: A critical review. *Clinical Practice and Epidemiology in Mental Health : CP & EMH*, *3*, 2. https://doi.org/10.1186/1745-0179-3-2

Patino, C. M., & Ferreira, J. C. (2018). Internal and external validity: Can you apply research study results to your patients?. *Jornal brasileiro de pneumologia : publicacao oficial da Sociedade Brasileira de Pneumologia e Tisilogia*, *44*(3),

183. https://doi.org/10.1590/S1806-37562018000000164

PDQ Supportive and Palliative Care Editorial Board. Depression (PDQ®): Health Professional Version. 2019 Apr 18. In: PDQ Cancer Information Summaries [Internet]. Bethesda (MD): National Cancer Institute (US); 2002-. https://www.ncbi.nlm.nih.gov/books/NBK65970/

Popoola, A. O., & Adewuya, A. O. (2012). Prevalence and correlates of depressive disorders in outpatients with breast cancer in Lagos, Nigeria. *Psycho-Oncology*, *21*(6), 675–679

Pudrovska T. (2010). Why is cancer more depressing for men than women among older white adults?. *Social forces; A scientific medium of social study and interpretation*, *89*(2), 535–558. https://doi.org/10.1353/sof.2010.0102

Pule, M. L., Buckley, E., Niyonsenga, T., & Roder, D. (2019). The effects of comorbidity on colorectal cancer mortality in an Australian cancer population. *Scientific Reports*, *9*(1), 8580. https://doi.org/10.1038/s41598-019-44969-8

Riba, M. B., Donovan, K. A., Andersen, B., Braun, I., Breitbart, W. S., Brewer, B. W., Buchmann, L. O., Clark, M. M., Collins, M., Corbett, C., Fleishman, S., Garcia, S., Greenberg, D. B., Handzo, R., Hoofring, L., Huang, C. H., Lally, R., Martin, S., McGuffey, L., Mitchell, W., … Darlow, S. D. (2019). Distress management, version 3.2019, NCCN clinical practice guidelines in oncology. *Journal of the National Comprehensive Cancer Network : JNCCN*, *17*(10), 1229–1249. https://doi.org/10.6004/jnccn.2019.0048

Roberto, L.-F., Amar K., D., César, A., Myrna M., W., & Mark, O. (2005). Depression in

US Hispanics: Diagnostic and management considerations in family practice. *The Journal Of The American Board Of Family Practice*, *4*, 282.

Rosenstock, I.M. (1974). Historical origins of the health belief model. Health Education Monographs, 1974; 2: 328–335.

Rosenstock, I. M. (1974). The Health Belief Model and Preventive Health Behavior. *Health Education Monographs*, *2*(4), 354–386.

Rosenthal, M. B., Zaslavsky, A., & Newhouse, J. P. (2005). The geographic distribution of physicians revisited. *Health services research*, *40*(6 Pt 1), 1931–1952. https://doi.org/10.1111/j.1475-6773.2005.00440.x

Salk, R. H., Hyde, J. S., & Abramson, L. Y. (2017). Gender differences in depression in representative national samples: Meta-analyses of diagnoses and symptoms. *Psychological Bulletin*, *143*(8), 783–822. https://doi.org/10.1037/bul0000102

Schapmire, T. J., & Faul, A. C. (2017). Depression symptoms in older adults with cancer: A multilevel longitudinal study. *Journal of Psychosocial Oncology*, *35*(3), 260–277.

Schappert, S. M., & Burt, C. W. (2006). Ambulatory care visits to physician offices, hospital outpatient departments, and emergency departments: United States, 2001-02. *Vital and health statistics. Series 13, Data from the National Health Survey*, (159), 1–66.

Schmitt, M. R., Miller, M. J., Harrison, D. L., & Touchet, B. K. (2010). Relationship of depression screening and physician office visit duration in a national sample.

Psychiatric Services, *61*(11), 1126–1131.

Sherrill, C., Smith, M., Mascoe, C., Bigus, E., & Abbitt, D. (2017). Effect of treating depressive disorders on mortality of cancer patients. *Cureus*, *9*(10), e1740. https://doi.org/10.7759/cureus.1740

Shinn, E. H., Valentine, A., Baum, G., Carmack, C., Kilgore, K., Bodurka, D., & Basen-Engquist, K. (2017). Comparison of four brief depression screening instruments in ovarian cancer patients: Diagnostic accuracy using traditional versus alternative cutpoints. *Gynecologic Oncology*, *145*(3), 562–568. https://doi.org/10.1016/j.ygyno.2017.03.024

Siegel, R. L., Miller, K. D., & Jemal, A. (2020). Cancer statistics, 2020. *CA: A Cancer Journal for Clinicians*, *70*(1), 7–30.

Sinyor, M., Rezmovitz, J., & Zaretsky, A. (2016). Screen all for depression. *BMJ (Clinical Research Ed.)*, *352*, i1617.

Siu, A. L., US Preventive Services Task Force (USPSTF), Bibbins-Domingo, K., Grossman, D. C., Baumann, L. C., Davidson, K. W., Ebell, M., García, F. A., Gillman, M., Herzstein, J., Kemper, A. R., Krist, A. H., Kurth, A. E., Owens, D. K., Phillips, W. R., Phipps, M. G., & Pignone, M. P. (2016). Screening for Depression in Adults: US Preventive Services Task Force Recommendation Statement. *JAMA*, *315*(4), 380–387. https://doi.org/10.1001/jama.2015.18392

Siu, A. L., US Preventive Services Task Force (USPSTF), Bibbins-Domingo, K., Grossman, D. C., Baumann, L. C., Davidson, K. W., Ebell, M., García, F. A., Gillman, M., Herzstein, J., Kemper, A. R., Krist, A. H., Kurth, A. E., Owens, D.

K., Phillips, W. R., Phipps, M. G., & Pignone, M. P. (2016). Screening for Depression in Adults: US Preventive Services Task Force Recommendation Statement. *JAMA*, *315*(4), 380–387. https://doi.org/10.1001/jama.2015.18392

Sloan, D. M., & Sandt, A. R. (2006). Gender Differences in Depression. *Women's Health*, 425–434. https://doi.org/10.2217/17455057.2.3.425

Smith H. R. (2015). Depression in cancer patients: Pathogenesis, implications and treatment (Review). *Oncology Letters*, *9*(4), 1509–1514. https://doi.org/10.3892/ol.2015.2944

Sperandei S. (2014). Understanding logistic regression analysis. *Biochemia Medica*, *24*(1), 12–18. https://doi.org/10.11613/BM.2014.003

Spitzer, R. L., Kroenke, K., & Williams, J. B. (1999). Validation and utility of a self-report version of PRIME-MD: The PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *JAMA*, *282*(18), 1737–1744. https://doi.org/10.1001/jama.282.18.1737

Strawbridge, R., Young, A.H., & Cleare, A.J. (2017). Biomarkers for depression: Recent insights, current challenges and future prospects. *Neuropsychiatric Disease and Treatment*; *13:1245*-62.

Světláková, L., Sláma, O., Světlák, M., Pochop, L., Šedo, J., Alexandrová, R., Bílek, O., & Vyzula, R. (2019). Prevalence of Anxiety and Depression and Their Impact on the Quality of Life of Cancer Patients Treated with Palliative Antineoplasic Therapy - Results of the PALINT Trial. Klinicka Onkologie : Casopis Ceske a Slovenske Onkologicke Spolecnosti, 32(3), 201–207.

Thalén-Lindström, A. M., Glimelius, B. G., & Johansson, B. B. (2016). Identification of distress in oncology patients: A comparison of the hospital anxiety and depression scale and a thorough clinical assessment. *Cancer Nursing*, *39*(2), E31–E39. https://doi.org/10.1097/NCC.0000000000000267

Thun, M. J., DeLancey, J. O., Center, M. M., Jemal, A., & Ward, E. M. (2010). The global burden of cancer: priorities for prevention. *Carcinogenesis*, *31*(1), 100–110. https://doi.org/10.1093/carcin/bgp263

Trindade, I. A., Ferreira, C., Borrego, M., Ponte, A., Carvalho, C., & Pinto-Gouveia, J. (2018). Going beyond social support: Fear of receiving compassion from others predicts depression symptoms in breast cancer patients. *Journal of Psychosocial Oncology*, *36*(4), 520–528. https://doi.org/10.1080/07347332.2018.1440275

Tsuguo, I., Ayako, M., Hidetaka, K., Daishu, M., & Eisuke, M. (2013). Predictive factors for psychological distress related to diagnosis of breast cancer. *Pscyho-Oncology*, *3*, 523

Tu, C. H., Hsu, M. C., Chi, S. C., Lin, H. Y., & Yen, Y. C. (2014). Routine depression screening and diagnosing strategy for cancer inpatients. *Psycho-Oncology*, *23*(9), 1057–1067. https://doi.org/10.1002/pon.3547

Tudiver, F., Edwards, J. B., & Pfortmiller, D. T. (2010). Depression screening patterns for women in rural health clinics. *The Journal of Rural Health : official journal of the American Rural Health Association and the National Rural Health Care Association*, *26*(1), 44–50. https://doi.org/10.1111/j.1748-0361.2009.00264.x

Tyrrell, P., Harberger, S., Siddiqui, W. (2020). Stages of Dying. In: StatPearls [Internet].

Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Retrieved from: https://www.ncbi.nlm.nih.gov/books/NBK507885/

U.S. Preventive Services Task Force (2002). Screening for depression: recommendations and rationale. *Annals of Internal Medicine*, *136*(10), 760–764. https://doi.org/10.7326/0003-4819-136-10-200205210-00012

U.S. Preventive Services Task Force (2009). Screening for depression in adults: U.S. preventive services task force recommendation statement. *Annals of Internal Medicine*, *151*(11), 784–792. https://doi.org/10.7326/0003-4819-151-11-200912010-00006

Valderas, J. M., Starfield, B., Forrest, C. B., Sibbald, B., & Roland, M. (2009). Ambulatory care provided by office-based specialists in the United States. *Annals of Family Medicine*, *7*(2), 104–111. https://doi.org/10.1370/afm.949

van den Bussche, H., Schön, G., Kolonko, T., Hansen, H., Wegscheider, K., Glaeske, G., & Koller, D. (2011). Patterns of ambulatory medical care utilization in elderly patients with special reference to chronic diseases and multimorbidity--results from a claims data based observational study in Germany. *BMC Geriatrics*, *11*, 54. https://doi.org/10.1186/1471-2318-11-54

VanDyke, S. D., & Shell, M. D. (2017). Health Beliefs and Breast Cancer Screening in Rural Appalachia: An Evaluation of the Health Belief Model. *The Journal of Rural Health : Official Journal of the American Rural Health Association and the National Rural Health Care Association*, *33*(4), 350–360.

Vodermaier, A., Linden, W., MacKenzie, R., Greig, D., & Marshall, C. (2011). Disease

stage predicts post-diagnosis anxiety and depression only in some types of cancer. *British Journal of Cancer*, *105*(12), 1814–1817.

Vodermaier, A., & Millman, R. D. (2011). Accuracy of the Hospital Anxiety and Depression Scale as a screening tool in cancer patients: a systematic review and meta-analysis. *Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer*, *19*(12), 1899–1908. https://doi.org/10.1007/s00520-011-1251-4

Van Voorhees, B. W., Cooper, L. A., Rost, K. M., Nutting, P., Rubenstein, L. V., Meredith, L., Wang, N. Y., & Ford, D. E. (2003). Primary care patients with depression are less accepting of treatment than those seen by mental health specialists. *Journal of general internal medicine*, *18*(12), 991–1000. https://doi.org/10.1111/j.1525-1497.2003.21060.x

von Wagner, C., Bonello, B., Stoffel, S. T., Skrobanski, H., Kerrison, R., & McGregor, L. M. (2019). Predictors of intention translation in flexible sigmoidoscopy screening for colorectal cancer. *Health Psychology*, *38*(12), 1083–1095

Wagner, L. I., Pugh, S. L., Small, W., Jr, Kirshner, J., Sidhu, K., Bury, M. J., DeNittis, A. S., Alpert, T. E., Tran, B., Bloom, B. F., Mai, J., Yeh, A., Sarma, K., Becker, M., James, J., & Bruner, D. W. (2017). Screening for depression in cancer patients receiving radiotherapy: Feasibility and identification of effective tools in the NRG Oncology RTOG 0841 trial. Cancer, 123(3), 485–493. https://doi.org/10.1002/cncr.29969

Wagner, L. I., Pugh, S. L., Small, W., Jr, Kirshner, J., Sidhu, K., Bury, M. J., DeNittis, A.

S., Alpert, T. E., Tran, B., Bloom, B. F., Mai, J., Yeh, A., Sarma, K., Becker, M., James, J., & Bruner, D. W. (2017). Screening for depression in cancer patients receiving radiotherapy: Feasibility and identification of effective tools in the NRG Oncology RTOG 0841 trial. Cancer, 123(3), 485–493. https://doi.org/10.1002/cncr.29969

Wagner, L. I., Spiegel, D., & Pearman, T. (2013). Using the science of psychosocial care to implement the new american college of surgeons commission on cancer distress screening standard. *Journal of the National Comprehensive Cancer Network : JNCCN*, *11*(2), 214–221. https://doi.org/10.6004/jnccn.2013.0028

Wakefield, C. E., Butow, P. N., Aaronson, N. A., Hack, T. F., Hulbert-Williams, N. J., Jacobsen, P. B., & International Psycho-Oncology Society Research Committee (2015). Patient-reported depression measures in cancer: a meta-review. *The Lancet. Psychiatry*, *2*(7), 635–647. https://doi.org/10.1016/S2215-0366(15)00168-6

Walker, J., Hansen, C.H., Martin, P., Symeonides, S., Ramessur, R., Murray, G., & Sharpe, M. (2014). Prevalence, associations, and adequacy of treatment of major depression in patients with cancer: a cross-sectional analysis of routinely collected clinical data. *Lancet Psychiatry*. 1(5): 343–350.

Walker, J., Holm Hansen, C., Martin, P., Sawhney, A., Thekkumpurath, P., Beale, C., Symeonides, S., Wall, L., Murray, G., & Sharpe, M. (2013). Prevalence of depression in adults with cancer: a systematic review. *Annals of Oncology: official journal of the European Society for Medical Oncology*, *24*(4), 895–900.

https://doi.org/10.1093/annonc/mds575

Wamala, S. P., Lynch, J., Horsten, M., Mittleman, M. A., Schenck-Gustafsson, K., & Orth-Gomér, K. (1999). Education and the metabolic syndrome in women. *Diabetes Care*, *22*(12), 1999–2003. https://doi.org/10.2337/diacare.22.12.1999

Wen, S., Xiao, H., & Yang, Y. (2019). The risk factors for depression in cancer patients undergoing chemotherapy: A systematic review. *Supportive Care in Cancer*, *27*(1), 57–67.

Whiteford, H. A., Degenhardt, L., Rehm, J., Baxter, A. J., Ferrari, A. J., Erskine, H. E., Charlson, F. J., Norman, R. E., Flaxman, A. D., Johns, N., Burstein, R., Murray, C. J., & Vos, T. (2013). Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease Study 2010. *Lancet*, *382*(9904), 1575–1586. https://doi.org/10.1016/S0140-6736(13)61611-6

Williams, S. Z., Chung, G. S., & Muennig, P. A. (2017). Undiagnosed depression: A community diagnosis. *SSM - Population Health*, *3*, 633–638. https://doi.org/10.1016/j.ssmph.2017.07.012

Wondimagegnehu, A., Abebe, W., Abraha, A., & Teferra, S. (2019). Depression and social support among breast cancer patients in Addis Ababa, Ethiopia. *BMC cancer*, *19*(1), 836. https://doi.org/10.1186/s12885-019-6007-4

World Health Organization, (2017). Depression and other common mental disorders: Global health estimates. Geneva: World Health Organization; Licence: CC BY-

NC-SA 3.0 IGO.

World Health Organization, Wilson, J. M. G. & Jungner, G. (1966). The principles and practice of screening for disease. World Health Organization. Retrieved from https://apps.who.int/iris/handle/10665/208882

Wen, S., Xiao, H., & Yang, Y. (2019). The risk factors for depression in cancer patients undergoing chemotherapy: a systematic review. *Supportive Care in Cancer*, *27*(1), 57–67.

Yabroff, K. R., Gansler, T., Wender, R. C., Cullen, K. J., & Brawley, O. W. (2019). Minimizing the burden of cancer in the United States: Goals for a high-performing health care system. *CA: A Cancer Journal for Clinicians*, *69*(3), 166–183. https://doi.org/10.3322/caac.21556

Yoon, H., Chatters, L., Kao, T.-S. A., Saint-Arnault, D., & Northouse, L. (2018). Predictors of quality of life and depression among Korean-American cancer patients and their family caregivers. *Psycho-Oncology*, *27*(12), 2717–2724.

Zhang, X., Lin, D., Pforsich, H., & Lin, V. W. (2020). Physician workforce in the United States of America: Forecasting nationwide shortages. *Human Resources for Health*, *18*(1), 8. https://doi.org/10.1186/s12960-020-0448-3

Zhu, J., Fang, F., Sjölander, A., Fall, K., Adami, H. O., & Valdimarsdóttir, U. (2017). First-onset mental disorders after cancer diagnosis and cancer-specific mortality: A nationwide cohort study. *Annals of Oncology : official journal of the European Society for Medical Oncology*, *28*(8), 1964–1969. https://doi.org/10.1093/annonc/mdx265