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Examining Fear of Recurrence in Cancer Survivors

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Walden University
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Abstract

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MA, The Chicago School of Professional Psychology, 2012

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Dissertation Submitted in Partial Fulfillment

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Abstract

Improvements in the medical field have given many cancer patients and survivors better odds of long-term survival. As more patients become survivors, the demand for psychological treatment becomes greater. The most prevalent concern of survivors is getting help with a psychosocial condition known as fear of recurrence (FOR). Prior to this study, few researchers had explored how having a more aggressive cancer influences the development of FOR. The purpose of this quantitative study was to determine whether cancer stage and type (a measurement of severity) are predictive of FOR development in the high-risk cancer groups lung and bronchus and female breast. The theoretical framework guiding this research was based on Mishel's theory of uncertainty in illness, which states that uncertainties about illness recurrence can cause survivors to experience breakdown in their lives (whether psychological and/or physical). The fear of cancer recurrence inventory (FCRI) survey was administered to 97 lung and bronchus and female breast cancer survivors; the survivors were asked to rate their level of discomfort about the possibility of a cancer recurrence. Data were analyzed using multiple linear regression. The results indicated that cancer type and severity both impacted the development and severity of FOR in lung and bronchus and female breast cancer survivors. Furthermore, regardless of the cancer type, stage of cancer, age of the survivor, or years in remission, survivors reported clinical levels of FOR in all areas of concern. Practitioners can use the current findings to work towards developing better intervention and treatment programs that promote quality survivorship and reduce the risk and rate of FOR in high risk cancer populations.

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Dedication

This dissertation is dedicated to my husband and son, Richard Satchwell and Mateo Satchwell, and my mother Ingrid Austin, for always believing in me and supporting me throughout the process. When times were tough, and I felt that all of this was too much, each of you taught me that the journey would not be worth it if it were not challenging. You never doubted my abilities even though I sometimes did. Thank you for keeping me on the path and giving me support along the way. I cannot thank you enough. You are appreciated beyond anything I can describe. I would also like to thank my deceased grandmother Martha Bruns and father Cornell Harrell Dixon for helping to build such a strong and dedicated woman. The both of you played a monumental part in my upbringing and perseverance. Without either of you, I would not be who I am today. I love all of you! Know that without you, there is no me!

Acknowledgments

The completion of this dissertation would not be possible without the support and help of many individuals. The number of eyes that have viewed this document is unbelievable. First, I give thanks to God for providing me with the strength, knowhow, and determination needed to be successful. There were many hiccups along the way but with you, family, and my team, anything seemed possible. I give thanks to Dr. Ellen Levine and Dr. Christopher K. Bass, both of whom acted as my committee chair at one point or another. The both of you have held my hand along the way, through good and bad. Without your unyielding support and knowledge, this journey would have been unbearable. The two of you not only helped me to see the finish line but continuously moved me towards it, no matter the obstacle. Thank you for your contribution to my success.

Immeasurable thanks and appreciation to Dr. Simard and Dr. Savard, the Relay for Life committee of Guadalupe County, and the cancer survivors who were willing to share their concerns and experiences with me. You made this study possible! Without each of your contributions, this study would have never taken flight. Know that with all our combined efforts, we are making needed advancements in the psycho-oncology field, ones that could help to improve millions of cancer survivors' quality of life. Thank you, a million times over, for being selfless and supportive!

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Chapter 1: Introduction

Being diagnosed with cancer has both short-term and long-term effects, many of which are negative and take time to adjust to or overcome. Having cancer can lead to an array of psychological and social issues, many of which interfere with being able to cope in a productive manner (Butow, Fardell, & Smith, 2015). Comorbidity, the coexistence of two or more medical conditions at once, is a threat to both cancer patients and survivors. Psycho-oncologists have tried to detect and deter the onset of psychological threats that may further dampen the patient or survivor's health (Zaider & Kissane, 2015). Although is known that depression, anxiety, and posttraumatic stress disorder (PTSD) are viable threats to an individual's mental wellbeing, researchers have shown that the fear of cancer returning may be the point from which these psychological issues first began to fester (Butow et al., 2015). Often referred to as the fear of recurrence (FOR) or fear of cancer recurrence (FCR), an estimated two-thirds of cancer survivors have difficulty accepting either that their treatment was successful and they are cancer free or feel that they may be living in a temporary state where their cancer has been eradicated but is fated to come back (Baker, Denniston, Smith, & West, 2005; Simard et al., 2013). Depending on the survivor's type of cancer and the severity of it during treatment, the FOR may become more pronounced or heightened over time (Butow et al., 2015; Simard et al., 2013; Simard & Savard, 2009).

In this study, I examined how cancer type and severity are interrelated with FOR development. This chapter contains the introduction to the study, the background information on the topic, the problem and purpose statements, theoretical framework,

research question, nature of the study, definitions of important terms, assumptions, limitations and delimitations, and the significance of the study. I also highlight the gap in literature for this area of FOR and the need for such a study in the field of psycho-oncology.

Background

One of the greatest challenges with cancer recurrence is that it is not likely to be detected as soon as it occurs. Many cancers go undetected in the earlier stages of recurrence because the symptoms are not pronounced enough to cause concern. Over their lifetimes, women have a 38% chance of developing cancer and men have a 43% chance (Howlader et al., 2015). Lifetime risk (the probability that an individual will develop, relapse, and or die from cancer within his or her lifetime) depends on his or her level of susceptibility, which is based on genetics, environment, ethnicity, age, and exposure to cancer provoking antigens (American Cancer Society, 2016a). Depending on these factors, an individual's risk may increase or decrease throughout his or her lifetime.

Cancer is the second most prominent cause of death for both women and men in the United State after heart disease; it impacts as many as 1,658,370 new people annually and kills as many as 1,620 people daily (or 589,430 annually; American Cancer Society, 2015b). In special cases, certain biomarkers, a measurable indicator of the severity or presence of the cancer, help to signal the presence of cancer sooner rather than later. More aggressive forms of breast cancer, for instance, are known for having such biomarkers, allowing medical professionals to eradicate and control for the cancer sooner (National Cancer Institute, 2016a). Advancements in genomics, proteomics, and

molecular pathology can be used to isolate biomarkers and improve cancer detection and cancer staging, but the field is still young and underdeveloped. Until further development, the threat of regrowth remains prominent, increasing and or exacerbating the fears cancer survivors have about cancer regrowth.

Baker et al. (2005) revealed that 59.8 to 68.1% of all cancer survivors fear recurrence and identify it as their primary worry with survivorship. Taylor, Richardson, and Cowley (2011) studied FOR and reported that participants entered a stage of guarding during recovery where fears of recurrence tended to take over. Taylor et al. (2011) stated, "Uncertainty about how to move beyond the cancer and progress health proved paralyzing to psychological recovery" (p. 245). FOR became such a concern for the survivors that the survivorship stage no longer was about living beyond and or overcoming the confines caused by having cancer but waiting to see if they would become cancer positive once again.

Problem Statement

For lung and bronchus cancer survivors, cancer redevelopment (or recurrence) is exceptionally high following treatment (American Cancer Society, 2015b; DeSantis et al., 2014). Lung and bronchus cancer are known for fast-paced growth and spreading. Only 44% of patients are expected to survive within the first year (American Cancer Society, 2013). The 5-year survival rate is approximately 16%; in rare instances of a localized lung or bronchus cancer, this percentage increases to 52% (American Cancer Society, 2013). The same does not appear to be true for female breast cancer, with the 1 to 5-year survival rate dependent on when the cancer was detected, if it is localized, and

the stage it is treated at. According to the American Cancer Society (2015b), more than half (61%) of breast cancers are detected at the localized stage; the 5-year survival rate for localized breast cancer is 99%. This number decreases to 85% when spread regionally (tissue or lymph nodes near and around the armpit areas) and 25% at the distance stage (collarbone, distant lymph nodes and or organs; author, year; American Cancer Society, 2015b). Other factors such as age, preexisting health complications, being African American or Hispanic American versus European American, and being overweight further decrease the 5-year survival rate for this group of cancer survivors (American Cancer Society, 2015b).

The literature on what types of cancer present the greatest psychological threat for FOR is lacking. There is a gap in the literature regarding the relationship between severity and type of cancer and risk of FOR development. The current literature is focused on the ways that FOR influences cancer survivors' psychosocial behaviors. Although it is known that FOR can cause panic and distress in unhealthy and unexpected ways for a third of cancer survivors (regardless of individual risk factors such as cancer growth rates), few comparisons have been made to determine if cancer type and severity play a part in FOR severity and frequency (Mehnert, Koch, Sundermann, & Dinkel, 2013; Park, Cho, Blank, & Wortmann, 2013).

Purpose of the Study

Although FOR is recognized in the psycho-oncology literature, few researchers have explored how having a more aggressive cancer (whether based on stage or type) influences the development of FOR. As many as 87% of cancer survivors have reported

mild levels of FOR but had not been tested and or treated for the condition by their physician (Butow et al., 2015). According to Butow et al. (2015), cancer survivors with higher FOR levels, particularly those with high recurrence rates (such as lung and bronchus and female breast cancer), typically reported an increase in anxiety and distress, a decrease in quality of life (QoL), more frequent intrusive thinking and maladaptive coping styles, and a weakened immune system and poorer health. As it relates to FOR, studies focusing on cancers affecting the lung and bronchus are significantly underrepresented, as well as those focusing on young female breast cancer survivors. Although these two groups present the greatest threat for cancer recurrence and mortality and they produce the highest clinical levels of FOR, little has been done to explore which cancer-specific factors prompt the development of FOR and how they can be mitigated in the event of an onset.

The purpose of this quantitative study was to explore the relationship between cancer severity, cancer type, and the development of FOR in lung and bronchus and female breast cancer survivors. The results from this study may help to provide psycho-oncologists and oncologists with information about which cancer survivor groups are at greater risk for FOR development. This information is critical for detecting, deterring, and facilitating psychological recovery throughout the survivorship stage. When survivors go untreated for psychological conditions directly linked to their cancer (such as FOR), they run the risk of immunosuppression. Immunosuppression is a reduction in the activity or efficacy of the immune system due to an adverse reaction to some treatment or other condition (Reiche, Nunes, & Morimoto, 2004). When the

hypothalamic-pituitary-adrenal axis is consistently activated due to chronic stress and worry, the immune system becomes impaired, which may contribute to the redevelopment and or progression of cancer (Reiche et al., 2004). By not treating FOR in these two high risk cancer groups, the oncologist is risking not only psychological detriment in his or her patient but a significant decrease in the functionality of the cellular immune response, which is vital to cancer prevention (Reiche et al., 2004).

Research Question and Hypotheses

In this research, lung and bronchus and female breast cancer survivors were asked to rate their thoughts, beliefs, and concerns about cancer recurrence via an online surveying website. There were a total of 14 independent variables, all of which were categorized into three main groups—the type of cancer, the severity of the cancer, and psychosocial factors. In addition to this, there were four control variables—ethnicity or race, age, education, and gender. The survey that was administered was the Fear of Cancer Recurrence Inventory (FCRI) survey developed by Simard and Savard (2009). The survey covered seven primary areas of concern associated with cancer recurrence fears: triggers, severity, psychological distress, coping strategies, functioning impairments, insight, and reassurance.

The following research question was formulated to help explore an underdeveloped area of FOR research. Although the psychological aspects of FOR are well known and researched, factors such as cancer severity and type and their interconnectedness to FOR have yet to be explored fully.

RQ 1: To what extent does the relationship between cancer type and severity influence the development of FOR in lung and bronchus and female breast cancer survivors when controlling for ethnicity, education, and gender?

$H_0$1a: There is no significant relationship between cancer type as it relates to the development of FOR in lung and bronchus and female breast cancer survivors.

$H_1$1a: The variable cancer type is significantly correlated to FOR development in both cancer survivor groups: lung and bronchus and female breast.

$H_0$1b: There is no significant relationship between cancer severity as it relates to the development of FOR in lung and bronchus and female breast cancer survivors.

$H_1$1b: The variable cancer severity is predictive of FOR development in both the lung and bronchus and female breast cancer survivor groups.

The research question listed above was analyzed with a multiple regression model to determine if there were any significant relationships between cancer type and severity and FOR development. The dependent variable was FOR, an ordinal variable. The independent variables were type, severity, and psychosocial factors. The control variables for this study were ethnicity or race, education, and gender.

Theoretical Framework for the Study

In chronic illnesses, there is a constant worry about disease recurrence. The uncertainty that comes with not knowing what will happen leaves many cancer survivors confused about how they should behave when they are in the survivorship stage; they experience a new normalcy. Mishel (1988) defined the theory of uncertainty in illness as uncertainties about illness recurrence that can cause survivors to experience breakdowns

in their lives (whether psychologically and or physically). This theory has been used in the psychiatric nursing profession to appraise how various aspects of a patient's illness play into the development of comorbid conditions such as FOR. The application of Mishel's framework to this study gave direction about how to alleviate and treat distress in cancer survivors suffering from uncertainties about cancer recurrence. In addition, it helped to clarify the biopsychosocial challenges of cancer treatment and recovery (Mishel, 1988; Park et al., 2013).

In this study, FOR contained many of the same components of uncertainty as defined by Mishel (1988). In the FOR literature, the survivor does not know when or if the cancer will redevelop. Although the physician can reassure the patient that the worst is over, there is no guarantee that the cancer has been eradicated forever. There is also uncertainty about when (the timeframe), where (the physical location of the cancer), and how severe (stage and aggressiveness) the recurrence may be. Most recurrences happen within a 5-year timeframe; however, cancer can redevelop at any point following a complete remission (American Cancer Society, 2016a; Simard et al., 2010). This is true of more aggressive cancers and cancers that occurred at an atypical age.

Many survivors also find that it is difficult to adjust or go back to a normal lifestyle that does not revolve around their cancer treatment; Mishel (1999) defined this stage as the antecedents of uncertainty. There is often comfort in having a health care team that can reassure the survivor that his or her fight is not in vain. When the fight has been won and the support team is not needed as often, the survivor might begin to feel emotionally exhausted because of his or her uncertainty. Aches and pains from treatment

or those that are phantom (nonexistent) become reminders that cancer is an unpredictable illness (defined as the appraisal process; Mishel, 1988). These influences play into the uncertainty or ambiguity of cancer recurrence, thus causing an emotional, social, and or a psychological breakdown in the survivor's life.

Nature of the Study

In this research, a multiple regression quantitative approach was used because it helped to quantify the relationship between FOR development and cancer-related factors (such as type and severity). I was able to explore whether the variables being studied were predictive of FOR development in lung and bronchus and female breast cancer survivors. Researchers may choose to use a multiple regression research design if they want to determine whether there is a relationship between two or more variables without purposely manipulating them. Researchers determine the nature of the relationship by pairing two or more variables together to see if a change will occur. The trends and patterns discovered are naturally occurring, meaning that there is no external force to cause or prompt the change (Creswell, 2013). Unlike with the qualitative approach, I was not attempting to describe and or interpret subjective human behaviors or social interactions. Once the researcher has identified how the multiple independent variables interact with the dependent variable, the information about the independent variables can be used to make more accurate predictions about why things are happening the way they are (Higgins, 2005).

The FCRI survey was used in this study to capture the multifaceted ways in which FOR impacts lung and bronchus and female breast cancer survivors during the

survivorship stage. As shown by Simard and Savard, the FCRI survey consists of 42 questions directed at understanding the degree and complexity of FOR by way of seven areas of primary concern: triggers (eight items), severity (nine items), psychological distress (four items), coping strategies (nine items), functioning impairments (six items), insight (three items), and reassurance (three items). I used an online surveying company to collect data. Each participant was electronically administered a copy of the questionnaire to complete. In the beginning of the survey, there is an inclusion criteria section; participants must complete this section in order to start and complete the actual questionnaire. Having this section helps to safeguard against missteps in the recruitment process. Upon completion, all information was sent back to me and thereafter coded, input, and analyzed with SPSS software.

Definitions

Breast cancer: A disease in which uncontrollable malignant cells form within the breast tissue (National Breast Cancer Foundation, 2015a).

Cancer staging: Details the extent of a person's cancer depending on the location of the tumor, cell type, size of the tumor, location of the cancer (if it has spread or stayed localized), and tumor grade (National Cancer Institute, 2015b). As noted by the National Cancer Institute (2015b), there are two main methods of cancer staging: (a) TNM staging—most widely used amongst hospitals and medical centers; T—size and extent of the tumor, N—the number of cancerous lymph nodes affected, M—whether the cancer has metastasized or spread from the primary location of the tumor and (b) Stage 0 to IV—Stage 0— (also called carcinoma in situ or CIS); there are abnormal cells present but

they have not spread to the tissue; Stage I, II, and III—cancer is present and is affecting tissue, the higher the number the larger the tumor and the more it has spread to the nearby tissues; Stage IV—the cancer has metastasized or spread to distant parts of the body.

FCRI survey: Developed by Simard and Savard (2009), the FCRI survey consists of 42 questions directed at understanding the degree and complexity of FOR in four cancer survivor groups (breast, prostate, colorectal, and lung). Simard and Savard's goals during survey development were to explore seven areas of primary concern for cancer survivors but to include them under one survey instead of several; these areas include triggers (eight items), severity (nine items), psychological distress (four items), coping strategies (nine items), functioning impairments (six items), insight (three items), and reassurance (three items). Simard and Savard also used the participants' demographic information to help highlight differences amongst groups based on age, sex, cancer site(s) (breast, prostate, colorectal, and lung), recurrence type (localized vs. metastatic), treatment type (surgery, radiotherapy, and chemotherapy), and time since diagnosis.

Fear of recurrence (FOR): The fear that a disease will come back or occur again (Simard et al., 2013).

Lung cancer: An uncontrollable malignant growth of cells within the tissue of the lungs (Cooley, Poghosyan, & Sarna, 2015). The two main types are nonsmall cell lung cancer (NSCLC) and small cell lung cancer (SCLC).

Psycho-oncology: A field in psychology that explores the psychological, social, and behavioral aspects of cancer, such as (a) how the patient responds psychologically to the disease and treatment and (b) the influence psychological, behavioral, and social factors have on disease progression (Holland & Weiss Wiesel, 2015).

Quality of life (QoL): The general wellbeing and satisfaction of individuals in their current state, most commonly referring to a person's physical and or mental health status (Mitchell, 2015).

Recurrence: To return, occur again, or reappear again and again (Butow et al., 2015).

Survivorship—sometimes referred to as the survivorship stage; (a) having no symptoms or signs of cancer following successful cancer treatment or (b) the process of overcoming cancer by living with, through, and beyond it (Cancer, 2016).

Assumptions

It was assumed that the participants of this study were going to answer the survey questions honestly and to the best of their ability. The participants were expected to respond solely on their own and no other individual should respond on their behalf. Based on the context of this study, the following assumptions were essential because the participants accessed the survey online. The survey questions were short in nature, close-ended, and easy to understand, which should have encouraged participants to respond truthfully and without the assistance of others.

The second assumption for this study was that the chosen sample is representative of the true population of lung and bronchus and female breast cancer survivors. Because

the population was chosen by means of nonprobability, purposive sampling, randomization did not occur. Unlike with random sampling, which uses an array of individuals with diverse backgrounds (age, religion, culture, ethnicity and nationality, gender and or sex, socioeconomic status, etc.), researchers who use purposive sampling are attempting to concentrate on set of characteristics (Gall, Borg, & Gall, 2003). This does not mean that the population cannot be diverse, as it pertains to some characteristics such as age, ethnicity, gender, and so on; however, individuals typically have one or more shared similarities, which is dependent on what the researcher needs to create a relevant research (Creswell, 2013; Frankfort-Nachmias & Nachmias, 2008). For a study that was focused on the phenomenon of FOR as it relates to two cancer types with varying severity, random sampling was just not feasible.

Scope and Delimitations

In this research, I sought to address the gaps in literature pertaining to cancer severity and type and their impact on FOR development. This focal point was chosen because too little research has been conducted on the uncontrollable factors, conditions or circumstances outside of the individual's control, associated with FOR. To date, the majority of FOR research has been primarily concerned with the psychological effects FOR has on cancer patients and survivors and how FOR has to potential to increase risks for comorbidity. By looking more into the uncontrollable factors associated with FOR, my hope was to better understand how lung and bronchus and female breast cancer survivors viewed their risks of recurrence while in the survivorship stage. If there are key components that pinpoint who is more at risk for developing FOR (such as having one

type of cancer or being diagnosed with a certain stage), discovering them could help psycho-oncologists deter or offset some of the psychological harms survivors experience when worrying about recurrence. The investigation included lung and bronchus cancer survivors, both male and female, 25 years of age and older and female breast cancer survivors 25 years of age and older. In either population, the participants must be in remission. Due to the nature of this study, the results can only be generalized within the lung and bronchus and female breast cancer population.

Limitations

Generalization across populations can be more complex to achieve. Although similarities are important to focus on, the differences may not allow the researcher to generalize information. Each cancer has its own set of features when it comes to prognosis: severity, mortality rate, recurrence rate, and so on. These features shape how the patient or survivor copes with and adapts to having cancer. Lung and bronchus and female breast cancer survivors were chosen as the study's focal populations because they are statistically at greater risk for recurrence and mortality. As noted by Mehnert et al. (2013) and Deimling et al. (2006), the greater the thought of risk is, the stronger the fear may become. Without the same level of risk, the fear of cancer recurrence may not register in the same manner regardless of how similar the participants are. The cancers alone are too dissimilar to attempt generalization across nonlung and bronchus and female breast cancer survivor populations.

Significance

The information presented in this study is unique because new risks associated with the development of FOR not previously explored by earlier research was addressed. Typically, FOR is described as a condition onset or caused by strong psychological influences (Ness et al., 2013). Most research has been limited to understanding FOR through this lens (Koch et al., 2013). It was not until recently that researchers noticed connections between the type of cancer and more severe, longer lasting spells of FOR (Humphris & Ozakinci, 2008; Ness et al., 2013). In this study, I addressed the gap in literature on how cancer type and severity impact FOR development in the top two deadliest cancers, lung and bronchus and female breast. More specifically, I focused on lung and bronchus cancers' high recurrence rate and low survival a significant predictor of FOR. Both cancer groups present the greatest threat of recurrence and mortality overtime when compared to all other cancer groups. In 2016 alone, an estimated 158,080 people died from lung and bronchus cancer and 40,450 from female breast cancer (American Cancer Society, 2016a). Likewise, the number of new cases annually for each cancer site are 224,390 and 246,660 respectively; these rates are the highest of any specialized cancer site and have been for over 2 decades (American Cancer Society, 2016a). By identifying which variables are predictive of FOR development in these two separate populations, physicians will have a better idea about which patients possess the greatest health risks, psychologically and physically.

The need to identify whether cancer type and severity play a role in FOR development is critical for tailoring intervention programs for cancer survivors and

patients. Creating and enforcing preventative measures may offset or at least prepare the client for many of the recurrence concerns that arise in the survivorship stage. Understanding all connections between these factors may lead to advancements in detecting and treating FOR in at-risk cancer populations. In the field of psycho-oncology FOR can be just as detrimental as depression and other mental health illnesses. To alleviate the threat of comorbidity, professionals look at ways to deter the onset of FOR; this research may help to highlight the relationship between cancer type and severity and FOR development not previously considered. Additional benefits include increasing awareness about FOR in the fields of psycho-oncology and oncology and encouraging more professionals to assess FOR throughout the various stages of treatment but more specifically, the survivorship stage (complete remission). Catching FOR sooner may also help to reduce immunosuppression, which could cause health concerns in the long run.

Summary

An introduction to the research topic was provided in Chapter 1, including background information on lung and bronchus and female breast cancer incidence and mortality rates and FOR rates for the disease. The problem and purpose statements were also included to explain the gaps in literature. The research question addressed was chosen because FOR research is lacking in areas that explore how uncontrollable factors impact development; instead, they focus more on the psychological effects of FOR. By using Mishel's (1988) theory of uncertainty in illness, I sought to understand what uncontrollable factors, such as cancer type and severity, influenced the development of FOR the most. In Chapter 2, I explore literature focusing on lung and bronchus and

female breast cancer prognosis and diagnosis, risk factors, incidence and mortality, and FOR development and coping, as well as recommendations for coping with FOR.

Chapter 2: Literature Review

Literature Research Strategy

A literature review was conducted to address the research question of this study. Publications were limited to the years 2005 and onward, except where older information was pertinent to understanding the condition. Older information was also used to highlight how views about FOR have shifted over time. A number of publications were found but not cited; the information was either too old to be relevant and or did not meet the specifications of the topic. For instance, the majority of studies conducted prior to 2003 focused on the psychological detriments of FOR, the detection and management of FOR, and constructive coping techniques. Shifts in focus and new discoveries have encouraged researchers to explore other facets of FOR in more recent years.

The literature reviewed was predominantly found in peer-reviewed, scientific journals and on creditable websites such as those that are government-run or representative of authoritative agencies and organizations. Google Scholar, PsycINFO, Academic Search Complete, ProQuest Central, Science Direct, PsycTESTS, PsycTESTS & Health and Psychosocial Instruments Simultaneous Search, and SAGE Premier were the primary queried databases. Key terms were used independently and in combination during the search. A minimum of 80 articles were found with this method and used for review in this study.

The themes and search terms used were chosen because they provided the most pertinent and useful information available, which helped to build the major sections of the literature review: *fear of cancer recurrence (FCR), FOR, fear of progression (FoP),*

survivorship, predictors of fear of recurrence, FCR in survivors, FOR prevalence by cancer type, cancer rehabilitation, psycho-oncology, oncology, QoL, lung carcinomas, disease uncertainty and cancer survivors, disease recurrence, recurrence rate, coping with lung cancer recurrence, psychosocial FOR, fatalism, maladaptive coping, aggressive cancers, lung and bronchus cancer and FOR, lung cancer staging, breast cancer staging, female breast cancer and FCR, and cancer severity and fear of recurrence.

Only a few themes emerged from the searches conducted due to the specific nature of the topic. The primary objective was to gain as much background information on FOR as possible then delve deeper and investigate how cancer severity and type, specifically, may promote stronger and longer-lasting bouts of FOR in lung and bronchus and female breast cancer survivors. This would help to fill in some of the gaps in the literature noted thus far.

The gap in the literature is on the relationship between severity and type of cancer and risk of FOR development. The current literature was focused on the ways that FOR influences cancer survivors' psychosocial behaviors. Although it is known that FOR can cause panic and distress in unhealthy and unexpected ways for a third of cancer survivors (regardless of individual risk factors such as cancer growth rates; Mehnert et al., 2013; Park et al., 2013), few comparisons have been made to determine if cancer type and severity play a part in FOR severity and frequency. Because this FOR focus is relatively new, limited information was found.

Introduction

One of the greatest challenges with cancer recurrence is that it is not likely to be detected as soon as it occurs. Many cancers go undetected in the earlier stages of recurrence because the symptoms are not pronounced enough to cause concern. Over their lifetimes, women have a 38% chance of developing cancer and men have a 43% chance (Howlader et al., 2015). Cancer is the second most prominent cause of death for both women and men in the United State after heart disease; it impacts as many as 1,658,370 new people annually and kills as many as 1,620 people daily (or 589,430 annually; American Cancer Society, 2015b). In exceptional cases, certain biomarkers, a measurable indicator of the severity or presence of the cancer, signal the presence of cancer sooner rather than later. More aggressive forms of breast cancer, for instance, are known for having such biomarkers, allowing medical professionals to eradicate and control for the cancer sooner (National Cancer Institute, 2016a). Advancements in genomics, proteomics, and molecular pathology are headed in a positive direction when it comes to isolating biomarkers and improving cancer detection and cancer staging but the field is still young and underdeveloped. Until further development, the threat of regrowth remains prominent, increasing and or exacerbating the fears cancer survivors have about cancer regrowth.

Baker et al. (2005) revealed that 59.8 to 68.1% of all cancer survivors fear recurrence and identify it as their primary worry with survivorship. Taylor et al. (2011) reported that participants entered a stage of guarding during recovery where fears of recurrence tended to take over. Taylor et al. stated, “Uncertainty about how to move

beyond the cancer and progress health proved paralyzing to psychological recovery" (p. 245). FOR became such a concern for the survivors that the survivorship stage no longer was about living beyond and overcoming the confines caused by having cancer but waiting to see if they would become cancer positive once again.

With the high level of uncertainty about cancer regeneration, survivors instinctively tend to have heightened concerns about their health. Whether the information they receive comes from a trusted source, such as their oncologist, or is discovered through the media, what is discovered is not always comforting or reassuring. Cancer is publicized in such a way that it is meant to be feared rather than overcome. For instance, in 2016 alone, it was estimated that 246,660 new cases of female breast cancer would be discovered, along with 224,390 new cases of lung and bronchus cancer for both males and females (American Cancer Society, 2016). Of those populations, 40,450 (16.4%) female breast cancer and 158,080 (70.4%) lung and bronchus cancer patients died respectively (American Cancer Society, 2016).

Although this information is meant to spread awareness, educate and promote smart health monitoring, and encourage proactive behaviors, it can heighten fears surrounding cancer recurrence. Within the last 20 years, researchers found that more survivors are struggling with survivorship, specifically learning to be cancer-free and not worrying about recurrence. This discovery lead to the exploration and study of a phenomenon called FOR, FCR) or FoP.

To date, few researchers have documented how cancer type and cancer severity play a role in FOR development and severity. Cancer researchers have shown that if

recurrence occurs, it will likely happen within 2 to 3 years following successful treatment (American Cancer Society, 2013, 2015b; DeSantis et al., 2014; National Cancer Institute, 2015a, 2016). It is during this timeframe and immediately after successful treatment that FOR is especially high in survivors. There is potentially a connection between cancer severity, cancer type, and FOR development and severity (Deimling et al, 2006; Koch et al., 2014; Linden et al, 2012; Mehnert et al., 2013). Understanding any and all connections between these factors may lead to advancements in detecting and treating FOR in at-risk cancer populations.

Theoretical Foundation

Cancer has the potential to affect a person physically, psychologically, and emotionally. Although the physical manifestation of cancer cannot be controlled for by the patient or the survivor, the psychological and emotional aspects can be. In the uncertainty in tallness theory, Mishel (1988) asserted that chronic or severe illnesses often produce a host of concerns for the affected individual. For many, finding meaning in the wake of uncertainty is key for overcoming and or managing stressors that might otherwise add to circumstantial issues. Mishel suggested that when an individual in unable to find meaning within his or her illness-related circumstance, uncertainty develops and he or she becomes somewhat of a victim to the disease. Mishel stated, "Uncertainty is defined as the inability to determine the meaning of illness-related events" (p. 225).

Mishel's (1988) work was primarily based in medical nursing but includes other disciplines' findings, such as psychology and oncology, to understand the patient's

cognitive processes of dealing with illness uncertainty. Structurally, the theory is based around three components or themes: (a) the antecedents of uncertainty, (b) the process of uncertainty appraisal, and (c) coping with uncertainty (Mishel, 1988). Mishel stated that uncertainty is not an inherent component of having or being diagnosed with a disease. It is not until the patient or survivor is faced with the potential for unresolve that the factor of uncertainty is introduced. With uncertainty, there are a number of outcomes, none of which are known. Without structure, the patient or survivor may begin to feel that his or her life is unknown. Uncertainty is perceived as harmful, dangerous, or as an opportunity for misfortune (Mishel, 1988). There is opportunity for restructuring and apposite coping. Coping strategies that employ an outcome of fortune, positivity, and or certainty produce greater or more beneficial results (Mishel, 1988).

The Antecedents of Uncertainty

Mishel (1988) acknowledged that in chronic illnesses there are typically two stimuli that can either dampen or increase thoughts of uncertainty: symptom pattern and event familiarity. Symptom pattern include the symptoms associated with the disease that are consistent, congruent, and present within a pattern. Patterns are often related to frequency, duration, and the type of physical response (Mishel, 1988). Event familiarity refers to environmental stimulation, typically that within the health care domain. Unlike symptom pattern that is based on physical sensations of the disease, event familiarity is primarily focused on the "habitual or repetitive nature of the structure of the environment" (Mishel, 1988, p. 226). For instance, a cancer patient must complete 11-sessions of chemotherapy. His or her process of receiving services becomes certain and

familiar. He or she must first check-in with the clinic clerk, vitals are then taken, and he or she is prepped for the procedure. Although the process may be unsettling, it is constant; getting the chemotherapy is a step in eradicating the cancer, which gives direction not only physically but psychologically and emotionally about future outcomes. It is when there is a disturbance in these stimuli that uncertainty begins to develop.

The Process of Uncertainty Appraisal

Appraisal is the second theme in this theory. Uncertainty may develop but it is neutral in meaning until the patient or survivor appraises it (Mishel, 1988). Appraisal is based on two inference and illusion. Inference involves evaluating the situation based on related experiences. If the individual has previously experienced uncertainty and was able to resolve the issue with a positive outcome, he or she may be optimistic that the current dilemma can be resolved in the same manner (Mishel, 1988). Illusion, on the other hand, refers to the beliefs formed from uncertainty (Mishel, 1988). If treatment has been going well and the prognosis appears positive, the illusion is positive. Illusion can be fostered by outside sources such as family, friends, and physicians who want to instill hope or positivity in their loved one. This illusion of positivity can only be upheld, however, if the information gained about the disease-related events are specific and nonambiguous (Mishel, 1988). Detailed information equates to structure, which diminishes uncertainty.

Coping with Uncertainty

There is an opportunity to cope in a positive or maladaptive manner. According to Mishel (1988), when the appraisal presents a threat or danger, the coping mechanism is likely to be negative. The two coping tracks are mobilizing—takes action and begins to vigilantly seek information and affect-management—the patient attempts to seek support, relies on faith, and or disengages from others and society (Mishel, 1988). The likelihood of maladaptive coping is high when the patient feels he or she has no control, but this can be buffered by significant others who provide comfort, new interpretations of the event, and guidance and support (Mishel, 1988). Additionally, seeking support from others who have been or are in a comparable situation is helpful.

A positive appraisal presents opportunity because the illusion formed around the situation is hopeful. The patient or survivor is preoccupied with benefit-finding or the positives that could come from uncertainty. As outlined by Mishel (1998), in illnesses where the trajectory deteriorates quickly, patients are more likely to adhere to treatment recommendations because they are hopeful for recovery.

Uncertainty in Illness: Relevance to this Study

Mishel's (1988) theory of uncertainty in illness was appropriate for this study because cancer, while curable, has the potential to reoccur. For many cancer survivors, this lingering thought may produce feelings of uneasiness or discomfort throughout the survivorship stage. In cancers with high recurrence, such as lung and bronchus and female breast, disease recurrence and uncertainty play a role in FOR development (Deimling et al., 2006; Koch et al., 2014; Linden et al., 2012; Mehnert et al., 2013). This

theory helped to explain the cognitive processes of coping and adapting to uncertainty when faced with the fear of cancer recurrence but Mishel does not address factors associated with certain diseases. It also helps clarify current literature's findings by shedding light on the biopsychosocial challenges of cancer treatment and recovery (Mishel, 1988; Park et al., 2013). The research question for this study was formulated to address whether cancer type and severity have a direct correlation to FOR development.

Review of the Literature

FOR is not a new phenomenon in the field of psycho-oncology; however, there are few studies that explore how more aggressive forms of cancer influence FOR development and growth. The two most lethal forms of cancer to date are lung and bronchus cancer and female breast (American Cancer Society, 2015b). Little evidence exists on lung and bronchus cancer while female breast cancer is over researched. However, only a handful of studies have shown how cancer severity and type may influence the development and strength of FOR in both cancer populations (Deimling et al., 2006; Koch et al., 2014; Linden et al., 2012; Mehnert et al., 2013). Uncertainty during illness is a predictor of FOR. A feature of severity in illness is being unable to predict with certainty, the longevity of the illness and whether it will return; and upon its return, how many times will recurrence occur, how soon after the initial treatment will the recurrence happen, and how treatable or curable is the cancer this time around (Berendes et al., 2010; Shaha, Cox, Talman, & Kelly, 2008). For the sake of the literature review, all of these areas were explored to see what information exists and where current research is lacking.

In this study, severity was measured by the following factors: age, stage of cancer (I-IV), and years in remission. Type represented the type of cancer. In this case, there were only two options, either lung and bronchus or female breast cancer, both of which have statistically been shown to have high mortality, recurrence, and FOR rates (American Cancer Society, 2015b). Psychosocial factors included the top four most reported psychological and social issues for lung and bronchus and female breast cancer survivors dealing with FOR. They included depression and anxiety, family life, stability, and spirituality or religion (Mehnert et al., 2013; Park et al., 2013; Prasertsri et al., 2011).

The cancers of interest, lung and bronchus and female breast, have been detailed independently. Because both cancers have specific characteristics (how staging is done, survival and mortality rates, cancer cell development, risk of metastasizing, rate of recurrence, etc.), it is best to detail the populations separately. Severity, type, and psychosocial factors have also been detailed independently so that they are understood as cancer-specific characteristics.

Lung and Bronchus Cancer

Cancers pertaining to the lungs, also known as lung carcinoma, are divided into two main categories: nonsmall and small cell. Nonsmall cell lung cancer accounts for approximately 80 to 85% of all lung cancer cases while the majority of the remaining 10 to 15% are small cell (American Cancer Society, 2016c). In either instance, the lungs, two cone-shaped spongy organs, have developed carcinoma abnormalities that inhibit the lungs from functioning properly, which disrupts other bodily functions (Cancer Treatment Centers of American, 2015a).

Types of lung cancer. NSCLC is the most prominent type of lung cancer, affecting an upward amount of about 85% of those diagnosed (American Cancer Society, 2016c). Within the NSCLC category, there are subsets or subtypes that are differentiated based on how the carcinoma alters certain cells in the lung tissue. American Cancer Society (2016c) stated, "Lung cancers typically start in the cells lining the bronchi and parts of the lung such as the bronchioles or alveoli" (p. 1). Certain types of lung cancer are more aggressive, while others are more easily detected and deterred. Each subset still upholds the nonsmall cell standard, but the carcinoma often reproduces and spreads differently and at varying speeds. Regardless of these factors, the treatment and prognosis for NSCLC tends to be identical across the board, hence the reason the subtypes are grouped together (American Cancer Society, 2016c).

Adenocarcinoma, squamous cell (epidermoid) carcinoma, and large cell (undifferentiated) carcinoma are the top three subtypes of NSCLC (Cancer Treatment Centers of American, 2015a). There are a few other, less common NSCLC subtypes such as sacomatoid carcinoma and adenosquamous carcinoma, but they are rarer and less likely to be seen in the overall population (American Cancer Society, 2016c). Adenocarcinoma is the leading subtype of NSCLC, occurring mainly in former and current smokers, women, younger people, and non-smokers exposed to secondhand smoke (American Cancer Society, 2016c). Adenocarcinoma is a slower moving type of lung cancer found on the outer parts of the lung. It is less likely to spread overall in comparison to other types of lung carcinomas (American Cancer Society, 2016c; Cancer Treatment Centers of American, 2015a; Holland et al., 2015).

Twenty-five to 30% of the NSCLC population has squamous cell (epidermoid) carcinoma, making it the second largest population for NSCLC type lung cancer (Holland et al., 2015). The airways to the lungs are lined in flat, scale-like cells called squamous cells. When these cells are exposed to harsh chemicals and or environments, cancer may begin to develop within the cells (American Cancer Society, 2016c; Holland et al., 2015). Because of the squamous cells' localization, this type of NSCLC is typically found within the central region of the lungs and the major air passages, also known as the bronchus (American Cancer Society, 2016c).

Large cell (undifferentiated) carcinoma is the third greatest tier of NSCLC. 10 to 15% of the NSCLC population falls underneath this category (American Cancer Society, 2016c). Of the NSCLCs, large cell is the most lethal. Unlike adenocarcinoma and squamous, large cell carcinoma reproduces and spreads so quickly that treatment is often more complicated and aggressive (Holland et al., 2015). Treatment is also less likely to completely eradicate the cancer, thus making recurrence a greater risk factor.

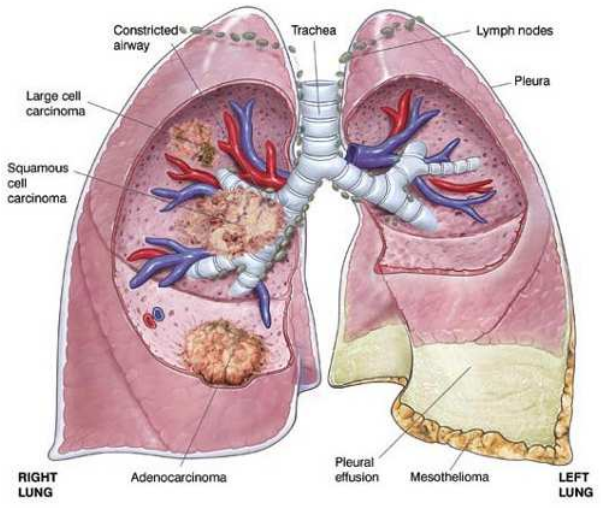

Figure 1. Non-small cell lung cancer (NSCLC; Google Images, 2016)

Small cell lung cancer (SCLC), the second type of lung cancer, is less common in comparison to NSCLC however, that does not make it any less lethal (Cancer Treatment Centers of America, 2015b). SCLC, sometimes referred to as *oat cell cancer*, is a fast-paced cancer that grows and spreads more rapidly than NSCLC. SCLC is the most aggressive type of lung cancer; not only does it grow and spread quickly, the tumors that it creates tend to be larger in size and like to metastasize (spread to other parts of the body) early on (American Cancer Society, 2016c). On more occasions than not, SCLC starts in the bronchi (*bronchus*, singular) breathing tubes at the center of the chest (Sorensen & Felip, 2009). Metastasis occurs more often in the brain, liver, and bones for SCLC (Sorensen & Felip, 2009); this is not the case for NSCLC where metastasis typically occurs in the breasts and chest region (American Cancer Society, 2016c).

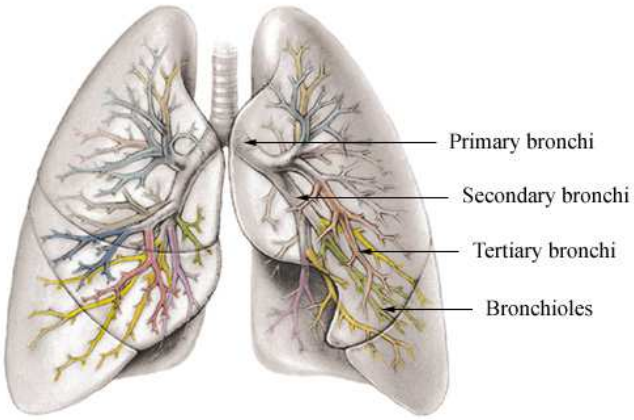

Figure 2. Bronchus/bronchi/bronchioles (University of Southern California Cardiothoracic Surgery, n.d.)

SCLC is a sneakier cancer in comparison to NSCLC. What is meant by this is that, it can spread to distant regions and be asymptomatic (Slotman et al., 2007). It is not until the lungs begin to malfunction and testing is done that other areas of the body with cancer are discovered. SCLC often spreads to the brain and causes no symptoms (Slotman et al., 2007). Considering that this happens often, many oncologists opt to take preventative measures before things can get worse. When the likelihood of metastasis to the brain is high, the patient must receive therapy for two locations. In addition to the lung(s), the brain is treated with radiation to deter metastasis; this method of treatment is called PCI or prophylactic cranial irradiation—when the patient has no current intracranial tumor but there is a considerable risk (Slotman et al., 2007). According to Slotman et al. (2007), at the time of original diagnosis, at least 18% of SCLC patients have brain metastases and within a 2-year timeframe, 80% of patients develop brain metastases. Unfortunately, "the presence of brain metastases is an indication of a poor prognosis" (Slotman et al., 2007, p. 665).

Metastatic lung cancer and recurrent or recurring lung cancer are different. Metastatic lung cancer occurs when cancerous cells break away and travel to distant parts of the body either through the blood or lymph system (Cancer Treatment Centers of America, 2015b). Metastatic lung cancer can develop both prior to diagnosis and or following treatment (Slotman et al., 2007). For many lung cancer patients, the cancer metastasizes before it is ever diagnosed. A recurring cancer is one that returns after treatment. If the lung cancer does return, it will likely do so anywhere from 2-3 years after a successful treatment (National Cancer Institute, 2015a). It can return to its original place of origin or elsewhere, however its return is what makes it recurring, not its returning location.

Lung cancer staging. Staging helps oncologists to keep track of how large the cancer is and how far reaching it is. Staging is a necessary component of diagnosis because depending on what is found, the doctor will decide which treatment(s) is best suited for the patient. Lung cancer can be staged with the contemporary number system or TNM staging. While they are very much alike, TNM pathologic staging is considered more accurate because the tumor is directly observed (American Joint Committee on Cancer, n.d.).

Number staging. The number staging system for lung cancer is broken into four main sections, I-IV (or 1-4). From I to IV, the cancer worsens and spreads; the higher the stage, the worse the prognosis, the more complex the treatment becomes, and the greater the risk for cancer recurrence (Cancer Research UK, 2014; National Cancer Institute,

2015b). Some doctors may choose to use further classifications by giving the stage a unit such as “A” or “B”. This helps to further identify how extensive the cancer is.

At stage I, the cancer is small and localized, meaning the cancer is only in one area of the lung; there is no cancer in the lymph nodes (American Joint Committee on Cancer, n.d.). According to the American Joint Committee on Cancer (n.d.), stage 1A lung cancers have tumors smaller than 3 cm. 1B tumors are between 3 and 5 cm and have likely spread to the bronchus—the main airway of the lung and or to the pleura, which is the membrane covering the lung. In some rare instances, the lung is partially collapsed (Cancer Research UK, 2014).

Stages II and III tend to be grouped together, this is because in both stages, the cancer has grown and has likely either affected the surrounding tissue and or lymph nodes (Cancer Research UK, 2014). When it has grown to such close surroundings, the cancer is deemed “locally advanced”. 2A lung cancer has two possible representations. Either the cancer is anywhere between 5 and 7 cm in size and the lymph nodes are free of carcinomas or the cancer is less than 5 cm and there are cancerous cells in the lymph nodes of the impacted lung (American Joint Committee on Cancer, n.d.). In either scenario, the cancer has the potential to spread to any nearby structures such as the pleura and bronchus. And like with 1B, there is a chance that the lung is partially collapsed.

2B lung cancer has multiple representations, as seen in 2A. Per Cancer Research UK (2014), either the cancer is 5 to 7 cm and the impacted lung(s) has cancerous lymph nodes or the cancer is:

- Larger than 7 cm but there are no cancer cells in any lymph nodes, OR

- Not in any lymph nodes but has spread into one or more of the following areas – the chest wall, the muscle under the lung (diaphragm), the phrenic nerve, or the layers that cover the heart (mediastinal pleura and parietal pericardium), OR
- In the main airway (bronchus) close to where it divides to go into each lung, OR
- Making part of the lung collapse, OR
- Any size but there is more than one tumor in the same lobe of the lung (p. 5).

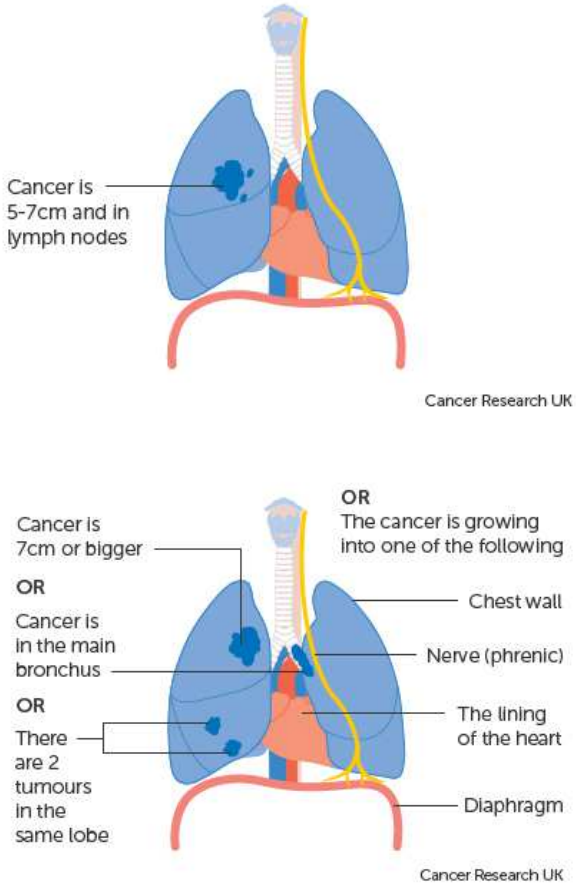

Figure 3. Stage 2B lung cancer scenarios (Cancer Research UK, 2014)

Stage III continues the trend of multiple representations and has the most alternatives. Regardless of the unit (A or B), in stage III the lung has likely collapsed or become inflamed due to mucus buildup overtime. In stage 3A, there are five different scenarios. Cancer Research UK (2014) listed them as follows:

- The cancer is in the lymph nodes close to the lung and the cancer is bigger than 7 cm
    - Has spread into one or more of the following areas – the chest wall, the muscle under the lung (diaphragm), or the layers that cover the heart (mediastinal pleura and parietal pericardium), OR
    - Has spread into lymph nodes close to the main airway or in the center of the chest on the same side as the affected lung
        - Any size but has grown into another major structure in the chest, such as the heart, the wind pipe (trachea), the food pipe (esophagus), the nerve that goes to the voice box (larynx), a spinal bone, or a main blood vessel. There may also be cancer cells in lymph nodes close to the affected lung, OR
        - In more than one lobe of the same lung and may have spread into lymph nodes close to the affected lung (p. 6-7).

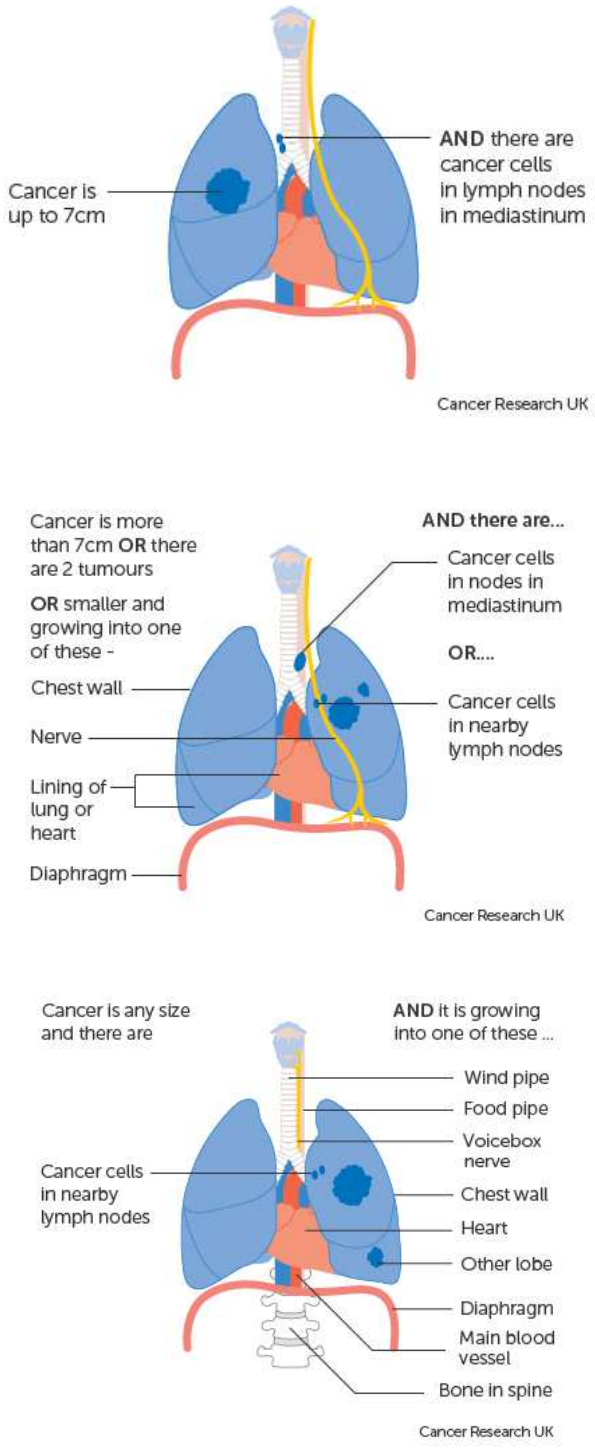

Figure 4. Stage 3A lung cancer scenarios (Cancer Research UK, 2014)

When a lung cancer patient is diagnosed with stage 3B the cancer is now in the lymph nodes on the opposite side of the chest away from the impacted lung (American Joint Committee on Cancer, n.d.). In another scenario, the cancer is in the lymph nodes of the mediastinum and has spread to one or more of these areas: the wall of the chest, the diaphragm (muscle under the lung), the layers covering the heart (mediastinal pleura and parietal pericardium), and or any major structure of the chest such as the trachea (windpipe), esophagus (food pipe), and main blood vessel (Cancer Research UK, 2014).

Stage IV lung cancer is a secondary or metastatic cancer, meaning that it has spread to another part of the body. Depending on the type of cancer, as mentioned above, some areas are more prone such as the brain, liver, and bones in SCLC and the breast and chest region for NSCLC (American Cancer Society, 2016c; Cancer Treatment Centers of America, 2015a). In any scenario both lungs have been impacted, the cancer has spread and or the cancer has caused fluid to collect near and around the lung(s) (malignant pleural effusion) or heart (pericardial effusion; Cancer Research UK, 2014).

TNM staging. TNM is the second method of lung cancer staging. The acronym stands for the size of the tumor (T), the number of lymph nodes (N) that have been impacted by the cancer cells, and whether the cancer has metastasized (M) to distant areas of the body. In 2010, an updated TNM staging system was enforced worldwide. This system, like the number system, uses units (both numbers and letters “a”, “b”, and “X”) to detail the progress of the cancer.

T (tumor) lung cancer is broken up into TX, T0, T1a, T1b, T2, T2a, T2b, T3, and T4. When a patient is given a TX designation, the main cancerous tumor cannot be

measured. T0 means that's the main tumor cannot be found. When stage T is given number values, the larger the number becomes, the larger the tumor is or the more it has grown into the surrounding tissues (National Cancer Institute, 2015a). For instance, in T1a lung cancer the tumor is less than 2 cm across and contained by the lung; the same applies to T1b except that the tumor is anywhere from 2-3 cm across (Cancer Research UK, 2014).

T2 lung cancer tumors measure anywhere from 3 to 7 cm. Those that are within the 3 to 5 cm range are classified as T2a and those ranging from 5 to 7 cm are T2b (Cancer Research UK, 2014). When it comes to growth and affecting other parts of the body, T2 lung cancer must meet one or more of the following criteria:

- The tumor has grown into the main (largest) bronchus airway more than 2 cm beneath the area that divides into each lung,
- The visceral pleura, also known as the inner lining of the chest cavity contains some or part of tumor material, and or
- The tumor has made part of the lung collapse (Cancer Research UK, 2014; National Cancer Institute, 2015b).

Tumors larger than 7 cm are given a T lung cancer stage of 3 (T3). According to Cancer Research UK (2014), cancers smaller than 7 cm can still receive a designation of T3 if they meet at least one of the three criteria:

- The tumor has grown into one of the follow structures—the chest wall, the central lining of the chest cavity (the mediastinal pleura), the muscle at the

bottom of the chest cavity (the diaphragm), or the outer covering of the heart (the pericardium; p. 7),

- The lung, in its entirety, has collapse due to the tumor, and or
- Two or more separate tumor nodules are identified within the same lobe of the lung.

T stage 4 lung cancer is the most threatening. At this stage, tumor growth worsens, and more significant effects begin to influence the overall functioning of major structures (Cancer Research UK, 2014). As recognized by the American Cancer Society (2016c), it has one or more of the following features:

- A tumor of any size has grown into the space between the lungs (mediastinum), the heart, the large blood vessels near the heart (such as the aorta), the windpipe (trachea), the tube connecting the throat to the stomach (esophagus), the backbone, or the carina.
- Two or more separate tumor nodules are present in different lobes of the same lung (p. 2-3).

The nodes (N) section of the TNM system is divided into NX, N0, N1, N2, and N3. NX implies that there is no measurable cancer in the nearby lymph nodes. The 0 in N0 represents there being no cancer within the lymph nodes. As the number increases, the greater the number of lymph nodes containing cancer (National Cancer Institute, 2015b). Patients with N1 lung cancer have cancerous cells in the lymph nodes closest to the affected lung. N2 patients have two scenarios; either there is cancer in the lymph

nodes in the mediastinum on the same side of the impacted lung or there is cancer in the lymph nodes under the windpipe branching to either lung (Cancer Research UK, 2014). A stage N3 diagnosis means one of three things:

- There is cancer in the lymph nodes on the opposite side of the chest, away from the affected lung, OR
- The lymph nodes above either collar bone have been obstructed, OR
- The nodes at the top of the lung are compromised (Cancer Research UK, 2014).

Metastases or stage M has three sections—M0, M1a, and M1b. Stage M0 represents a "negative" for metastases or no signs of the cancer spreading to another lobe of the lung or other regions of the body. M1a and M1b are the equivalent of the number stage IV. In M1a there are either tumors in both lungs or cancerous fluid surrounding the heart and lung (Holland et al., 2015). When there are cancerous lung cells in other parts of the body (bones, breast, liver, brain, etc.), the patient is diagnosed with having stage M1b lung cancer (Holland et al., 2015).

Lung and bronchus treatment options. Because of the complexity of lung cancer, many patients have an unfavorable prognosis. Treatment options are plentiful; however, the disease is hard to eradicate. Depending on what the patient needs, the oncologist will choose the best form(s) of treatment. It is important to note that many lung cancer patients go through various rounds of treatment because the recurrence rate is exceptionally high for this type of cancer (American Cancer Society, 2015b). For those facing an aggressive or more advanced type of lung cancer, the priority is not only to

alleviate symptoms and eradicate the cancer, but to stay ahead of it if it recurs at a later date.

An oncologist treating lung cancer bases his or her treatment options on the following factors: 1) the stage, 2) whether the cancer has spread (metastasis), 3) the side of effects of treatment, 4) the patient's age and overall health prior to treatment, and 5) the patient's preferences, expectations, and goals for treatment (Holland et al., 2015). Depending on what is discovered in the consultation(s), the oncologist will likely choose between surgery, chemotherapy, neoadjuvant therapy, radiation, and or biological or targeted cancer therapy. Again, these options are contingent on whether this is the patient's first time being diagnosed with lung cancer; different therapies may be chosen over others, especially if the cancer has grown or there is no visible progress made in reducing the tumor size.

Surgery. Surgery—the physical removal of cancerous tumors and other organic tissue, both healthy and or diseased, is the oldest and most commonly prescribed remedy for removing cancers of all types (Mayo Clinic, 2016a). If surgery is required or the best option available to the patient, the patient will have one or more of the four following procedures: wedge resection, segmental resection, lobectomy, and or pneumonectomy (National Cancer Institute, 2016b). From the least to most invasive, a wedge resection removes a minimal section of the area affected by the carcinoma (Mayo Clinic, 2016a; Nicholas, 2016). In most cases, a tumor is present and must be removed. To reduce the chances of cancerous cells or tissue being left behind, a margin of healthy tissue is removed along with the tumor (Nicholas, 2016). Segmental resection is very much like

wedge resection except that a larger portion is taken from the lung however, not to the extent of removing an entire lobe (Mayo Clinic, 2016a).

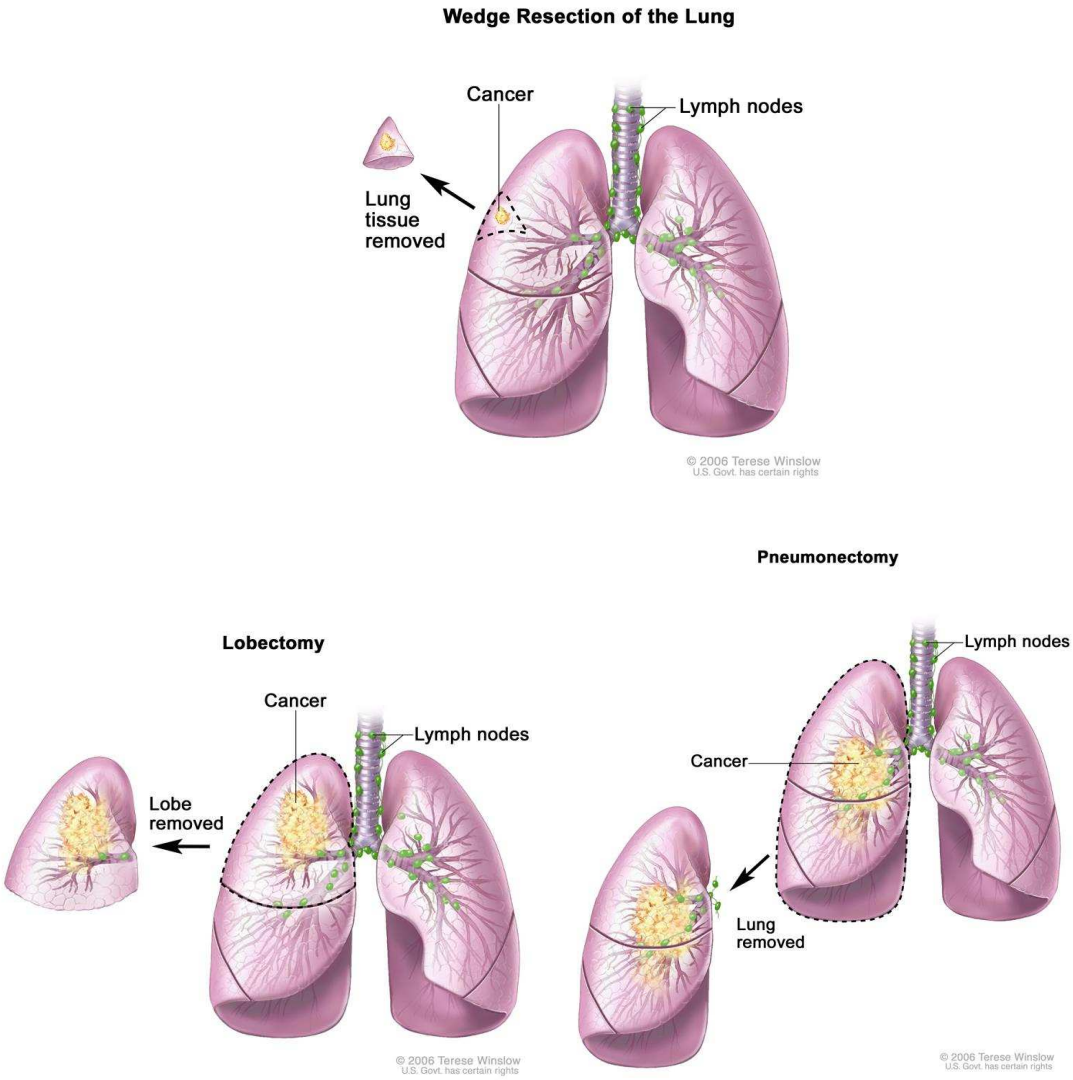

Figure 5. Wedge resection, lobectomy, and pneumonectomy surgery of the lung (National Cancer Institute © Terese Winslow (LLC), 2016b)

Lobectomy and pneumonectomy are used sparingly and reserved only for more severe or advanced lung cancers (Nicholas, 2016). A lobectomy involves removing an

entire lobe of one lung whereas the pneumonectomy removes the lung in its entirety (Cancer Treatment Centers of America, 2016). Some surgeons opt to also remove lymph nodes from the chest. Lymph nodes are removed for two reasons; either they are cancerous and must be removed to reduce certain risks or their removal is a diagnostic precautionary measure (Mayo Clinic, 2016a; Nicholas, 2016). Lymph nodes that have been removed but have not been diagnosed as being cancerous prior to surgery are usually taken to check for signs of cancer (Cancer Research UK, 2014). In the event that the lymph node(s) comes back positive for cancer, the oncologist can alter his or her approach to treatment to include these areas of the chest.

While surgery is the most commonly used method, it is not always the most beneficial method for cancers pertaining to the lungs. This is because lung cancer surgeries are risky; the probability of bleeding, infection, and the lungs collapsing are especially high (Cancer Research UK, 2014; Nicholas, 2016). The recovery process is just as critical. Recovery presents its own set of dilemmas and obstacles, some of which could have longstanding or ominous effects on the patient or survivor.

Chemotherapy. Chemotherapy is often used in combination with surgery and or radiation therapy to kill off any remaining cancerous cells and malignant tumors (Mayo Clinic, 2016a; Nicholas, 2016). In cases where the tumor needs to be reduced in size or shrunken prior to surgery, a short round of chemotherapy may be given prior to surgery; this is called neoadjuvant chemotherapy—treatment is given as a first step to address the tumor prior to the main treatment, which is usually surgery (Cancer Research UK, 2014; Gray et al., 2009; Nicholas, 2016).

Other types of neoadjuvant therapy include radiation and hormone therapy prior to surgery (Gray et al., 2009). Some of the main benefits of neoadjuvant chemotherapy are, it "has the potential to reduce tumor volume, address micrometastatic disease early, and improve outcomes" (Gary et al., 2009, p. 879). Additionally, completing treatment in this order makes the removal of the cancer easier and or less risky (Gray et al., 2009; Mayo Clinic, 2016a).

Chemotherapy also helps to reduce the growth of cancerous cells by stunting the rate that the cells develop (Gray et al., 2009; Mayo Clinic, 2016a; Nicholas, 2016). With chemotherapy, cells are often unable to mature, which hinders them from reproducing during treatment (Nicholas, 2016). Chemotherapy drugs can be taken intravenously or orally throughout the treatment period, which may last a number of weeks or months with breaks in between to recover. Patients that suffer from advanced stage cancers may choose to undergo chemotherapy to relieve pain and other symptoms (American Cancer Society, 2016c; Mayo Clinic, 2016a Nicholas, 2016). In dire situations, chemotherapy may help to extend an individual's life by fighting off the cancer as much as possible but not curing the patient of the disease; in such cases, the patient is likely terminal and is using treatment to extend the amount of time he or she has with loved ones and to get his or her affairs in order (Nicholas, 2016).

Radiation therapy. Radiation therapy utilizes x-rays and protons sourced through high-powered energy beams, needles, and catheters to kill cancerous cells (American Cancer Society, 2016c; Mayo Clinic, 2016a). This type of therapy can be done with external beams outside the body or internally via an implant of some sort (brachytherapy;

Nicholas, 2016). Brachytherapy involves placing the radiation near the cancer with needles, catheters, and radioactive implants, which can be difficult in some situations; in any instance, the objective is to target unhealthy cells, leaving the healthy ones unaffected by the treatment (American Cancer Society, 2016c; Nicholas, 2016). This type of therapy can be used before and or after surgery if necessary, however only so much radiation can be given before it no longer becomes a treatment option (Cancer Treatment Centers of America, 2016). Excessive radiation exposure can cause poisoning, further increasing the risks of the patient and offsetting the treatment and recovery process (American Cancer Society, 2016c).

Biological or targeted cancer therapy. The newest type of lung cancer treatment is targeted therapy (also known as biological therapy). Targeted therapy uses specific molecular targeting drugs in combination with chemotherapy to block the growth and or spread of cancerous cells by interrupting the processes that are involved in the production of these cells (Nicholas, 2016). Targeted therapies are different from chemotherapy because they: 1) act on specific molecular targets instead of just rapidly dividing cells (both normal and cancerous), 2) are purposely designed to interact with their intended target, and 3) block tumor cell proliferation (cytostatic) as opposed to killing tumor cells (cytotoxic; National Cancer Institute, 2014).

This therapy is not suitable for all lung cancer types. Patients receiving this type of treatment have specific abnormalities and genetic mutations not commonly seen throughout the population, such as the EGFR mutation (epidermal growth factor receptors; Cancer Research UK, 2014; Mayo Clinic, 2016a). Out of a sample of 100

NSCLC patients, 10 to 15 will have a positive EGFR mutation (Cancer Research UK, 2014). To be treated with targeted therapy, most oncologists will require the patient to get lab testing done to see if he or she would be a suitable candidate.

Targeted therapy medications include but are not limited to erlotinib (Tarceva), crizotinib (Xalkori), afatinib (Gilotrif), ramucirumab (Cyramza), bevacizumab (Avastin), ceritinib (Zykadia), and nivolumab (Opdivo; Holland et al., 2015Mayo Clinic, 2016a; Nicholas, 2016). According to Nicholas (2016), the following drugs promote recovery by:

- Interfering with the signaling mechanisms involved in cellular regrowth,
- Interrupting and preventing the development of blood vessels to the cancer cells (angiogenesis),
- Promoting known mechanisms that enhance cell death (apoptosis),
- Stimulating the immune system to destroy cancer cells, and
- Being a part of the transport system that delivers specific toxic drugs to kill cancer cells (p. 22-23).

This treatment is very new to the field of oncology; more research is needed in the area to see whether these drugs could potentially be used in other valuable ways for a larger percentage of the population.

Survivorship and mortality risk factors. The differential rates of mortality for lung cancer are significantly greater (more severe) than with any other cancers, hence the reason it is considered the most lethal of cancers (Kim et al., 2012). According to the American Cancer Society (2015b), an upward amount of about 75% of people with lung

cancer have incurable, locally advanced or metastatic disease upon being diagnosed. In 2013 there were 228,190 new cases of lung and bronchus cancer; within the same year, 159,480 patients and survivors died from the illness (American Cancer Society, 2013). Lung and bronchus cancer account for 1 out of 4 cancer deaths and each year, more people die of lung cancer than prostate, colon, and breast combined (American Cancer Society, 2016c). Between the years 2012 and 2015, approximately 14% of new cancer diagnoses were for lung (American Cancer Society, 2016c).

Men are more likely to develop lung cancer than women in their lifetime. However, about 80% of all smokers will develop lung cancer at some point in their life regardless of their sex (Nicholas, 2016). The American Cancer Society (2016b) estimated that every 1 in 14 men and 1 in 17 women would be diagnosed with lung cancer in the year 2016-2017. Black males in particular are at s greater risk for developing lung cancers of all types; some 20% higher than White males (Center for Disease Control and Prevention, 2016). Despite their overall risk being greater, SCLC is 15% less common in Black males than White males but more common in men than in women (American Cancer Society, 2016c). This SCLC statistic tends to be true for Black females as well. In comparison to White women, Black women are 30% less likely to develop SCLC and 10% less likely to develop lung cancer of any kind (American Cancer Society, 2016c; Center for Disease Control and Prevention, 2016).

Female Breast Cancer

There are an estimated 3.1 million female breast cancer survivors in the United States as of 2014 (DeSantis et al., 2014). This number continues to rise as advancements

in treatment become more effective, detection services are expanded to lower income and disadvantaged populations, and the methods of detection become more refined and sophisticated. Within the next decade (by 2024), DeSantis et al. (2014) estimated that a total of 3.9 million women will have survived and been successfully treated for invasive breast cancer in the United States alone. Despite these wondrous improvements, FOR remains a psychological and emotional threat to breast cancer survivors, sometimes to the extent that stress encourages immunosuppression, which stunts the essential recovery and healing processes (Motz & Coukos, 2011). Prior health complications, naturally occurring or age-related and those occurring unnaturally, further complicate survivorship.

Female breast cancer is known as being an aggressive type of cancer. Most notably, it is increasingly becoming known for striking younger populations and having a greater recurrence rate (Brewster et al., 2008). The overall survival rate has increased from 74.8% in 1975—1977 to 90.3% in 2003—2009, however recurrence remains a prominent and frequent fear for survivors (DeSantis et al., 2014; Koch et al., 2014). Female breast cancer typically impacts women 50 years of age and beyond. Eighty-nine percent of cases occur in this age group, with the remaining 11% belonging to individuals younger than 45 years (Center for Disease Control and Prevention, 2015a). With increased age, there runs a greater risk of female breast cancer recurring and new primary cancers developing elsewhere in the body (National Breast Cancer Foundation, 2015a). However, younger women diagnosed with breast cancer tend to have more aggressive cancer, meaning that it is harder to eradicate and usually requires more intense treatment

and for a longer period (Center for Disease Control and Prevention, 2015a; DeSantis et al., 2014).

It is important to note that breast cancer also impacts men, however for the purpose of this research, male breast cancer patients will not be included. Only the top two most common and lethal cancers for men and women will be explored. Male breast cancer is rarer than female breast cancer, by far. Of the estimated 231,840 new breast cancer cases in 2015, only 2,350 were for males (approximately 1% of the population; American Cancer Society, 2015b). Additionally, male breast cancer, while still traumatizing, does not have the same rates of recurrence and is not as lethal as female breast cancer. The American Cancer Society (2015b) listed the top 10 most common and lethal cancer sites for women and men. When looking at both lists for men, breast cancer was not listed. However, for women, breast cancer was the second deadliest and has significantly higher recurrence rates.

Types of breast cancer. The breast contains glands called lobules, thin tubes called ducts, the nipple, and breast tissue, which contain blood vessels, lymph nodes, and fat and connective tissue. Cancerous cells known as carcinomas can impact all of these areas. Unfortunately, as the cancer becomes more pronounced, these areas may begin to work together, helping the cancer to spread beyond its original starting point. Below is a list of the most prominent types of breast cancer to date.

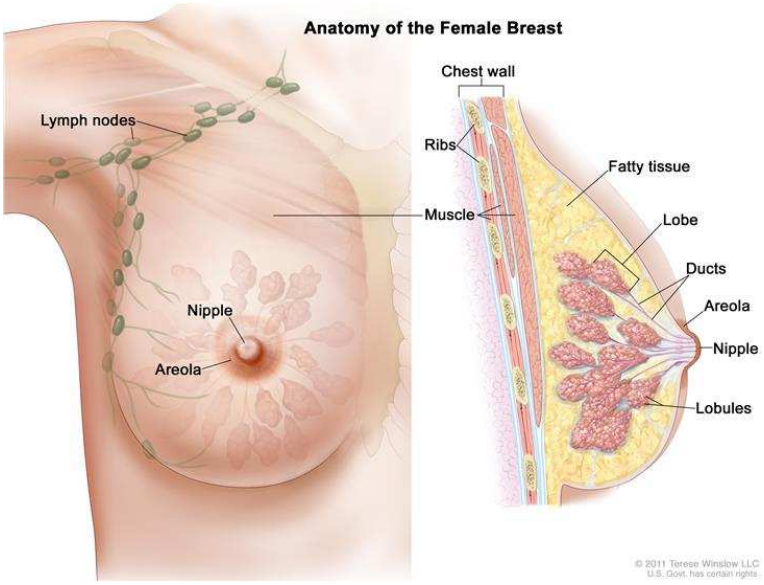

Figure 6. Anatomy of the female breast (National Cancer Institute © Terese Winslow (LLC), 2016a)

Invasive (infiltrating) and noninvasive (in situ) breast cancer. The two broadest categories for detailing the *type* of breast cancer are invasive (infiltrating) and noninvasive (in situ). Invasive breast cancer, in a sense, has a very literal name; the cancerous cells of the breast break through the tissues and spread throughout the body per the bloodstream and lymph nodes (National Breast Cancer Foundation, 2015a). It is estimated that 1 in 8 women will develop an invasive form of breast cancer (American Cancer Society, 2015b). When a woman has an invasive cancer, chances are, it originally started in the ducts or glands of the breast then gradually spread or grew into the tissue (National Breast Cancer Foundation, 2015a). Once in the tissue, the cancer has the opportunity to spread to nearby lymph nodes and beyond.

Within the invasive cancer population there are two subtypes. Invasive ductal carcinoma (IDC), a cancer with cells starting in the milk duct, is the most common form

of invasive cancer; it accounts for 80% (or more) of all cases (National Breast Cancer Foundation, 2015a). IDC starts in the milk duct, breaks through the wall, and attacks the breast tissue. After attacking the tissue of the breast, it can remain localized (stay near the original site of the tumor) or spread elsewhere within the body (Cancer Treatment Centers of America, 2015a). The latter option is more problematic and has a worse prognosis.

The second subtype of invasive cancer is invasive lobular carcinoma (ILC), which starts in the lobules or milks glands and spreads. Only about 10% of invasive cancers are ILC (National Breast Cancer Foundation, 2015a). Early detection is usually determined by a thickening of the breast in some areas as opposed to a lump (National Breast Cancer Foundation, 2015a). The remaining percentage of the invasive breast cancer population has a combination of IDC and ILC.

Ductal carcinoma. Ductal carcinoma is the most common type of noninvasive breast cancer. In the United States, every 1 in 5 or 60,000 new cases annually are for ductal carcinoma in situ (National Breast Cancer Foundation, 2015a). This particular type of cancer begins in the milk ducts (the thin tubes that carry breast milk from the lobules to the nipple; Johns Hopkins Medicine, 2016). It is here that cancerous cells latch onto the lining of the milk ducts and begin to wreak havoc. If the ductal carcinoma is *in situ* (DCIS), it has not spread through the wall of the duct and into the breast tissue (National Breast Cancer Foundation, 2015a). For many women, DCIS will leave behind lesions. These lesions are high traffic areas for cancer to spread. Left untreated,

cancerous cells may move beyond the duct and spread to this exposed tissue (Johns Hopkins Medicine, 2016). If this occurs, the breast cancer is deemed invasive.

If the ductal carcinoma has become invasive, it is renamed invasive ductal carcinoma (IDC); cancerous cells, as mentioned above, have grown into the duct line, broken through the wall of the duct, and invaded the local breast tissue (Johns Hopkins Medicine, 2016). IDC is a challenging cancer to track and treat because there is the chance that the cancer may metastasize or move quickly to other parts of the body such as distant organs and lymph nodes. Unfortunately, women with IDC require more aggressive treatment to eradicate the breast cancer (Johns Hopkins Medicine, 2016).

Lobular carcinoma. Lobular carcinoma is a unique type of condition because it is not actually a cancer at all because there are no cancerous cells present; however, the presence of abnormal cells is a strong indication that the milk-producing glands of the breast are heading in that direction (Breast Cancer, 2016). For someone with LCIS, the abnormal cells have not spread through the wall of the lobules and beyond but remain within the lobules. Because these cells are not, at this point, cancerous, treatment may not be recommended. Typically, an oncologist will monitor the area regularly to ensure that the cells do not change but if they do, treatment is started at the most treatable stages. Approximately 25% of women with LCIS will develop breast cancer in their lifetime and chances are, it will appear in the lobules or ducts of the breast (National Breast Cancer Foundation, 2015a). For women with a family history of breast cancer, mild radiation or surgery may be encouraged to eradicate these abnormal cells before cancer develops.

Invasive lobular carcinoma (ILC) is a cancer, accounting for about 1 in every 10 invasive breast cancers (American Cancer Society, 2015b). ILC's cancerous cells start in the lobules and invade nearby tissue. In some cases, the cancer may metastasize to distant body parts.

Inflammatory breast cancer (IBC). Inflammatory breast cancer (IBC) is another type of unique and rare cancer, affecting anywhere from 1 to 3% of all breast cancer patients (American Cancer Society, 2015b). What is unique about it is that the cancer starts within the soft tissues of the breast. IBC is considered a locally advanced cancer because it develops very rapidly and will likely spread from its original location to nearby tissue and lymph nodes (Cancer Treatment Centers of America, 2015a).

In the beginning, the affected soft tissue of the breast causes the lymph vessels in the skin to get clogged or blocked (Cancer Treatment Centers of America, 2015a). The blockage then causes the breast to physically appear swollen and red, hence the name. However, there is no inflammation involved. Women with IBC often note that the affected breast is extremely tender, firm, itchy, and warm to the touch. This is because there is an increased blood flow to the affected breast and a buildup of white blood cells in the area (National Breast Cancer Foundation, 2015a). Given this information, many women are treated with antibiotics for a breast infection such as mastitis. IBC cannot be treated with antibiotics and subsequently does not go away within the 7 to 10 days treatment is given.

Because the symptoms of IBC can be mistaken for other illnesses, many women go untreated for too long. Unfortunately, unlike many other type of breast cancer, IBC is

a very aggressive and fast-paced cancer (Cancer Treatment Centers of America, 2015a). The majority of first-time diagnoses are already in an advanced stage such as IIIB or IV. By this point, the cancer is on the verge of or has already metastasized to distant lymph nodes and organs making treatment more intense and the risk of recurrence substantially greater (American Cancer Society, 2013, 2015b).

Metastatic. When a cancer has metastasized, cancerous cells have spread to another part of the body, away from the tumor's original location (National Cancer Institute, 2015b). Metastatic breast cancer is classified as stage IV cancer. Breast cancer can be metastatic at diagnosis or following treatment (National Cancer Institute, 2015b). Metastatic cancer and recurring cancer are not the same. A recurring breast cancer returns to the same part of the same breast whereas the metastatic cancer is not reappearing but has spread to new areas and may break off and affect the second breast (National Cancer Institute, 2015b).

For women with metastatic breast cancer, cancerous cells can spread by invading nearby healthy cells and replicating, penetrating the circulatory or lymph system, traveling through the bloodstream to other organs and parts of the body, and lodging into capillaries (National Breast Cancer Foundation, 2015a). If the breast cancer metastasizes, it will more than likely do so in the breast or area where the breast used to be, chest wall, bones, lung and or around the lungs, liver, and or the brain (Cancer Treatment Centers of America, 2015b; National Breast Cancer Foundation, 2015a).

Paget's disease of the breast. Paget's disease of the breast (also commonly referred to as Paget's disease of the nipple and mammary Paget's disease) is a rare cancer

affecting the ducts of the nipple and the skin of the nipple and areola (Cancer Treatment Centers of America, 2015b; National Health Service, 2016). Of all the breast cancers, Paget's is the most mysterious and least understood. To this day, doctors are still theorizing about how it starts and develops. Only about 5% of the breast cancer population is struck by Paget's disease (Cancer Treatment Centers of America, 2015a).

Many women go undiagnosed for Paget's disease of the breast for an extended period of time because the symptoms are inconsistent; they tend to come and go. The majority of women are first diagnosed with having dermatitis or eczema; this is because many of the "starter" symptoms are the same. The cancerous cells cause the nipple and skin in this region to become compressed or flattened, scaly or flaky, tender, itchy, red and puffy, sensitive to touch, and or leaky with a yellow or bloody discharge (Cancer Treatment Centers of America, 2015b; National Health Service, 2016). When the symptoms are not cured with antibiotics and topical ointments or they worsen, a biopsy, mammogram, ultrasound, breast MRI, and or culture may be administered (American Cancer Society, 2015a). It is during this time that malignant cells known as Paget's cells are discovered on the epidermis of the nipple and or areola and in the milk ducts (Cancer Treatment Centers of America, 2015b; National Health Service, 2016). Thereafter, the oncologist stages the cancer based on the condition of the affected areas and if there are any tumors present.

A breast with Paget's disease breast does not usually have any tumors. If tumors are present, more times than not, it is in one breast, not both, and the tumor is elsewhere in the breast (Cancer Treatment Centers of America, 2015b; National Health Service,

2016). The most accepted theory of Paget's disease of the breast is that cancer cells from a nearby tumor drifted off and traveled to the milk ducts and thereafter to the nipple and areola (National Health Service, 2016). This is the most accepted theory because the majority of cancer patients with this condition are found to have tumors within the same breast but in an area away from the ducts, nipple, or areola (National Health Service, 2016). These tumors go undetected until the nipple and areola show visible signs of an illness. According to the National Health Service (2016), depending on the extent of the cancer, tumors range from being ductal carcinoma in situ (non-invasive) to invasive. Another widely accepted theory is, the cells in the nipple and areola become cancerous on their own, independently of breast tumors (National Health Service, 2016). In a few scenarios, Paget's disease of the breast is discovered and there are no tumors in the affected breast at all, debunking the theory that a tumor is needed to encourage cancer in these areas (Cancer Treatment Centers of America, 2015b; National Health Service, 2016).

Papillary carcinoma of the breast. Also known as papillary breast cancer, papillary carcinoma of the breast is a rare invasive ductal breast cancer affecting no more than 1% of the breast cancer population (Pal et al., 2010). The cancer is made up of benign papillary cells (called papules) that are shaped like a finger. The cells collectively develop into benign a tumor called papilloma (Pal et al., 2010).

While the mass majority of papilloma tumors are negative for cancer following a biopsy, oncologists will examine the tumor cells under a microscope to be sure (Pal et al., 2010). It is here that small quantities of cancerous cells may be discovered. Papillary

breast cancers are known for having both in situ and invasive cells, hence the reason most physicians will recommend the surgical removal of the tumor and radiation to the entire breast regardless of the biopsy results (Pal et al., 2010). Papillary breast cancer rarely extends to the lymph nodes. Compared to others breast cancers, it has one of the best prognosis for invasive ductal cancer and is easier to eradicate (Pal et al., 2010). Because the tumors are small and positive for estrogen and or progesterone receptors but not HER-2 receptors, they can be treated with chemotherapy, radiation, and biological or endocrine hormone therapies (Pal et al., 2010).

Triple negative breast cancer (TNBC). The majority of breast cancers are fueled by three receptors: estrogen, progesterone, and the hormone epidermal growth factor receptor 2/neu gene (HER-2). A healthy breast contains all three receptors to help stimulate and maintain normal cell growth. Two out of 3 women with breast cancer have both the estrogen and progesterone receptor and 20 to 30% have an overabundance of the HER-2 receptor (National Breast Cancer Foundation, 2015b). In this particular cancer, the malignant cells do not contain any of the three receptors, hence the name triple negative breast cancer. Approximately 10 to 20% of all breast cancers are triple negative, in addition to this; they are also usually invasive and begin in the ducts of the breast (American Cancer Society, 2016a).

Staging breast cancer. Staging is one of the first and most significant diagnostic tools. It helps the medical professional decide what should be done to treat the cancer, deter cancer growth, decrease tumor size, and relieve as many physical symptoms as possible. It also helps with prognosis— a prediction about the course and outcome of a

disease or the likelihood of recovery (if applicable). Depending on the type of cancer, the extent of the disease, tumor grade, metastasis, age, sex, ethnicity, and the patient's medical history, an estimate can be given about the expected survival rate and quality of survival for that particular patient.

Staging with TNM-Pathologic system equivalents. The American Joint Committee on Cancer (AJCC; 2016) developed a cancer staging system that details an individual's cancer progress based on tumor size (T), impacted lymph nodes (N), and metastasis (M). The system detailed below utilizes pathologic staging. Pathologic staging routinely explores physical examinations, biopsies, imaging tests, and surgery results to get a more accurate picture of the cancer's progress (American Joint Committee on Cancer, 2016). Thereafter the T, N, and M are given number values to detail what was found in these tests. Depending on what is discovered, a plan of action will be developed by the treating physician. All cancer patients are given an individualized treatment plan; while the cancer may be the same, it is not guaranteed that the person with the cancer will respond the same way to treatment. Therefore, it is important to stage the cancer accordingly and in advance.

Stage 0—Tis, N0, M0

- *Ductal carcinoma in situ* (DCIS) is the earliest form and most common type of breast cancer; it is often referred to as pre-cancer because cancerous cells remain within the duct of the breast and have not begun to impact the surrounding fatty tissue of the breast (Tis; American Cancer Society, 2016b).

- *Lobular carcinoma in situ* (LCIS) or stage 0 is typically not recognized as a true cancer or pre-cancer. This condition of the breast occurs when abnormal cells begin to form in the lobules or milk glands of the breast (Tis; American Joint Committee on Cancer, 2015). These abnormal cells are not cancerous, however someone with this condition has a greater probability of developing breast carcinoma overtime (Breast Cancer, 2016).

  LCIS is found via a breast biopsy, typically because there was a breast lump or abnormal mammogram. It is important to note that LCIS is not visible via mammograms (Breast Cancer, 2016). Regardless of the reason for testing, women with LCIS are asked to consider minimal or less aggressive forms of treatment to reduce the risk of invasive breast cancer from developing (National Breast Cancer Foundation, 2015a).
- Paget's disease of the nipple (with no associated tumor mass) is a rare form of breast cancer. It is theorized that tumor cells from other regions of the breast travel and spread to the nipple via the milk ducts (tumor grade Tis; National Health Service, 2016). Once there, the cells begin to manipulate and alter the cells that make up the tissue of the nipple. Paget's disease is poorly understood, making it hard to stage on the scale of breast cancer. In prior years, Paget's disease was not considered a true cancer. Because there are no underlying tumor masses, it is listed as being stage 0 or Tis on the TNM scale (National Health Service, 2016). It can

only be discovered via a tissue biopsy, which is often prompted when a patient complains of her nipple(s) itching, thickening, and or crusting with increased redness (National Health Service, 2016).

- Stage 0 is most importantly recognized as the stage without spreading cancer; there is no cancer in the lymph nodes (N) or distant sites (M).

Stage 1A—T1, N0, M0

- A tumor is a present and is about ¾ of an inch (2 cm) or smaller across (T1).
- The cancer has not spread to nearby lymph nodes (N0) or distant organs (M0).

Stage 1B—T0 or T1, N1mi, M0

- There remains evidence of a tumor, which is 2 cm or less across or in some rare instances cannot be found (T0 or T1).
- In 1 to 3 of the axillary lymph nodes there is micro-metastases. The cancer lies within the underarm lymph nodes and is greater than 0.2 mm across and or has more than 200 cells; however, it is never larger than 2 mm (N1mi).
- There is no evidence that the cancer has spread to distant sites (M0).

Stage IIA—T0 or T1, N1 (but not N1mi), M0

- There remains evidence of a tumor, which is 2 cm or less across or in some rare instances cannot be found (T0 or T1) and either:

- The cancer has spread to 1 to 3 of the axillary (underarm) lymph nodes with the cancer measuring larger than 2 mm across (N1a), OR
- A minuscule amount of cancer cells have been discovered in the internal mammary lymph nodes (the nodes near the breast bone) on a sentinel lymph node biopsy (N1b), OR
- The cancer has spread to 1 to 3 of the axillary (underarm) lymph nodes and to internal mammary lymph nodes found per the sentinel lymph node biopsy (N1c).

- The cancer shows no signs of metastasizing or metastasis (M0).

Stage IIA—T2, N0, M0

- The tumor is larger than 2 cm but less than 5 cm across, which is approximately 2 in. (T2).
- The cancer has not spread to the lymph nodes (N0) nor has it spread to distant sites (M0).

Stage IIB—T2, N1, M0,

- The tumor is larger than 2 cm but less than 5 cm across, which is approximately 2 in. (T2).
- 1 to 3 of the axillary lymph nodes has been impacted by the cancer and or a minuscule amount of cancer is found in the internal mammary lymph nodes per the sentinel lymph node biopsy (N1).
- Metastasis has not occurred (M0).

Stage IIB—T3, N0, M0

- The tumor is larger than 5 cm across but has not begun to grow into the chest wall or skin (T3).
- No lymph nodes have been impacted (N0) and metastasis has not occurred (M0).

Stage IIIA—T0 to T2, N2, M0

- The tumor is larger than 5 cm across or cannot be found (T0 to T2).
- 4 to 9 axillary lymph nodes have been impacted by the cancer or the cancer has enlarged the internal mammary lymph nodes (N2).
- The cancer has not spread to distant regions (M0).

Stage IIIA—T3, N1 or N2, M0

- The tumor is larger than 5 cm across but has not begun to grow into the chest wall or skin (T3).
- The cancer has spread to 1 to 9 axillary nodes or to the internal mammary nodes (N1 or N2).
- There is no metastasis (M0).

Stage IIIB—T4, N0 to N2, M0

- The tumor has begun to grow into the chest walls or skin (T4) and one of the following has taken place:
    - It has not spread to the lymph nodes (N0).

- 1 to 3 of the axillary lymph nodes have been affected by the cancer and or tiny amounts of cancer have been discovered in the mammary lymph nodes on a sentinel lymph node biopsy (N1).
- The cancer has spread to 4 to 9 of the axillary lymph nodes, or it has caused the internal mammary lymph nodes to become enlarged (N2).
- The cancer has not spread to distant regions (M0).
- "Inflammatory breast cancer is classified as T4d and is at least stage IIIB. If it has spread to many nearby lymph nodes (N3) it could be stage IIIC, and if it has spread to distant lymph nodes or organs (M1) it would be stage IV" (American Cancer Society, 2016b, p. 4-5).

Stage IIIC—any T, N3, M0

- The tumor is any size or cannot be located and one of the following has occurred:
  - 10+ axillary lymph nodes have cancer (N3).
  - The infraclavicular lymph nodes—those lying under the collar-bone, are now cancerous (N3).
  - Cancer has spread to the supraclavicular lymph nodes—those above the collar-bone (N3).
  - The cancer involves axillary lymph nodes and has caused the internal mammary lymph nodes to become enlarged (N3).

- 4+ axillary lymph nodes have cancer and tiny amounts of cancer have been discovered via the sentinel lymph node biopsy on the internal mammary lymph (N3).

- The cancer has not spread to distant regions (M0).

Stage IV—any T, any N, M1

- Stage IV is the most problematic stage of cancer; this is because the cancer has metastasized (spread) to distant lymph nodes and or organs. When metastasis takes place, areas such as the bone, liver, brain, and lungs must be examined thoroughly as they are the most common sites for cancer of the breast to spread (National Cancer Institute, 2016a).

Treatment options for breast cancer. For every person diagnosed with breast cancer, there should be an individualized treatment plan. A competent professional explores nearly every facet of a patient's health-life to determine which plan(s) of action is best suited for her. Factors such as age, sex, lifetime health issues, menstruation and menopause (if applicable), general health, breast cancer type, the location and extent of the cancer, tumor size, previous treatments (if applicable), and others are all important for determining which steps to take next and hopefully relieve the patient of cancer (National Cancer Institute, 2016a). Below is a list of some of the most commonly used treatment methods for women with breast cancer.

Surgery. Above all other treatments, surgery is used the most often as a first line of defense. Because surgery tends to get rid of cancerous cells and tumors more swiftly, with fewer side effects, it is used nearly all the time (Nicholas et al., 2015). Even in

situations where radiation is administered first, surgery typically follows thereafter, ensuring that the majority of the cancerous tissue, cells, tumors, lymph nodes, etc. are removed from the body as much as possible (Nicholas et al., 2015).

Mastectomy. A simple mastectomy (also known as a total mastectomy) is the removal of an entire breast (Office on Women's Health, 2010b). Mastectomies are chosen for several reasons. In a sizeable percentage of the breast cancer population, mastectomies are chosen because the cancer is too aggressive, a generous portion of the breast has been affected, and or the risk of recurrence is too great and removing the breast gives a better prognosis (National Cancer Institute, 2016a; Office on Women's Health, 2010b). Most simple mastectomies do not remove the lymph nodes, however when the lymph nodes are removed, the mastectomy is called radical. In a radical removal, the surgeon takes the lymph nodes, muscles, overlying skin, and nipple of the breast (National Cancer Institute, 2016a).

Preventive (prophylactic) mastectomies are used when the surgeon must remove all the breast tissue that is prone to developing breast cancer (note, there is no breast cancer at the time of surgery; Mayo Clinic, 2016b). Preventive mastectomies are typically reserved for patients with a significant family history of breast cancer, dense breasts, hail from Ashkenazi Jewish descent, or have been tested for the BRCA1 and BRCA2 gene mutation and the results are positive (Mayo Clinic, 2016b). A patient with an exceptionally high recurrence rate may also opt to have this procedure done to avoid going through treatment again. Unfortunately, mastectomies of any kind do not

guarantee a breast cancer-free life; approximately 10% of these women will still go on to develop breast cancer at some point in their life (Mayo Clinic, 2016b).

Breast-conserving surgery. A lumpectomy and quadrantectomy are breast-conserving methods, sometimes referred to as a partial mastectomy. These procedures still involve the surgical remove of part of the breast however; there is still a breast when surgery is completed. A lumpectomy surgery involves removing the tumor and a small amount of cancer-free tissue within the surrounding area of the tumor. Whereas a quadrantectomy is like a lumpectomy except that more of the breast tissue is taken from around the tumor (up to a fourth of the entire breast, hence the name quadrant).

Lymph node removal. Most doctors like to keep the lymph nodes intact if they are healthy because they play a vital part in the immune system, however when impacted, they can have an adverse effect on the patient (American Cancer Society, 2014a). If the lymph nodes have been compromised by cancer, the surgeon may choose to remove 10 to 20 lymph nodes underneath the arm; this surgery is called axillary lymph node dissection or ALND (American Cancer Society, 2014a). This type of surgery is risky because it can cause intense swelling in the arm, commonly referred to as lymphedema (American Cancer Society, 2014a).

A sentinel lymph node biopsy (SLNB) is a different type of lymph node removal. For this treatment, the doctor removes only a few nodes—those that are most likely to get tumor drainage (the sentinel nodes; American Cancer Society, 2014a). In order to remove all of the areas receiving the drainage, the surgeon injects the area with a radioactive substance or dye. The areas with drainage thereafter will be highlighted and

removed. By removing only these select lymph nodes, the risk of cancer traveling is decreased, and the patient has an easier recovery with fewer health risks (American Cancer Society, 2014a).

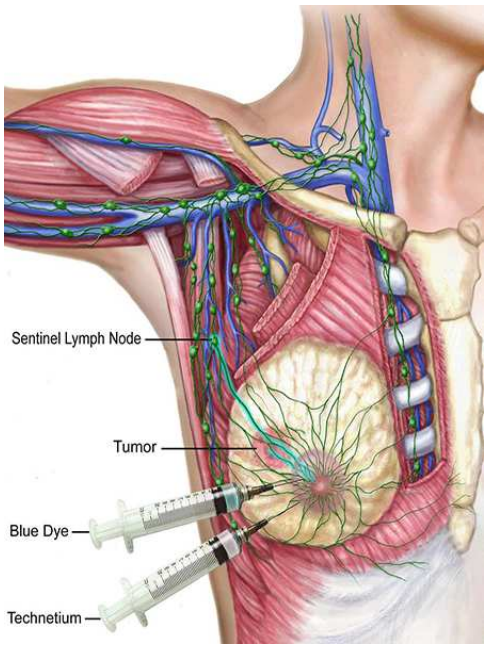

Figure 7. Sentinel lymph node detection (Intramedical Imaging, 2016)

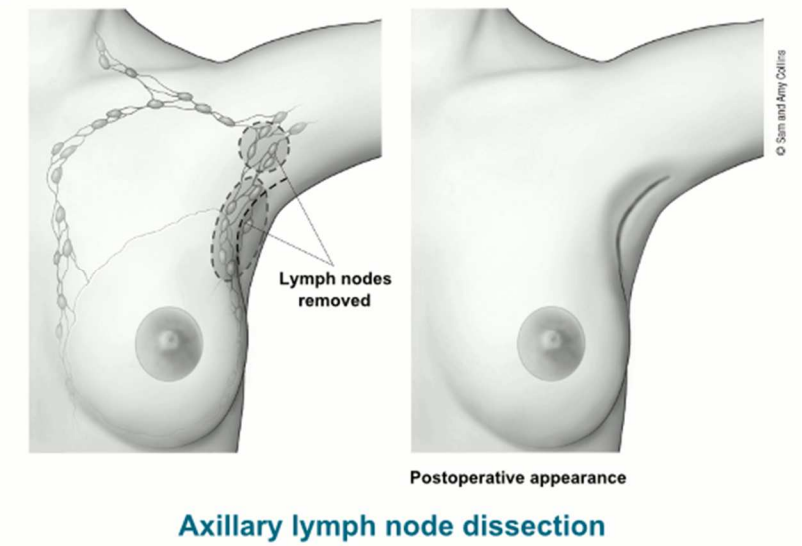

Figure 8. Axillary lymph node dissection (ALND; American Cancer Society, 2014a)

Chemotherapy. Chemotherapy is an all-inclusive solution to treat cancer of any kind. Unlike radiation, chemotherapy is used to treat the woman's entire body, not just the affected area, in this case the breast (American Cancer Society, 2016a). The drug is cancer killing but unfortunately, it also attacks healthy cells. Administered intravenously (via the vein) or orally, the chemo drug enters the bloodstream and begins to attack cells that divide quickly—including but not limited to cancer cells, bone marrow cells, hair follicles, and cells that line the mouth and intestines (Living Beyond Breast Cancer, 2015).

Chemotherapy is administered in rounds. Depending on the dosage needed to treat the patient's stage and type of cancer, the rounds may vary in length. Naturally, treatments are longer for advanced stage breast cancer because the cancer has caused more damage throughout the body (Living Beyond Breast Cancer, 2015). Chemotherapy treatments can be administered prior to surgery (neoadjuvant chemotherapy) or afterwards (adjuvant chemotherapy; Living Beyond Breast Cancer, 2015). When the chemo is administered prior to surgery, it is done anywhere from 3 to 6 months beforehand (Nicholas et al., 2015). This gives the tumor time to shrink so that when surgery is done, it is not as extensive. Per Nicholas et al. (2015), it also gives the doctor time to see if the cancer will respond to the chemo treatment.

Adjuvant chemotherapy—when the chemo is given after the surgery, works best for patients who will likely have an easy surgery but there is some concern that cancerous cells or tissue were left behind (Living Beyond Breast Cancer, 2015). If the cancer is new, there is always the concern that new cancerous cells are developing but have not

been detected. As a preventative measure, chemo is administered to reduce the risk of more tumors developing and the cancer spreading elsewhere in the body (Living Beyond Breast Cancer, 2015).

Radiation therapy. Radiation therapy can happen in two ways, either internally or externally. External beam radiation is a radiation therapy that uses a focused external beam (from outside the body) to target cancer in certain areas of the breast (DeSantis et al., 2014; Holland et al., 2015). Depending on what treatments were used in the past and the area of the body treated with surgery, certain areas will be more responsive to treatment. For instance, if a woman has a mastectomy but none of her lymph nodes were impacted by the cancer, the chest walls and drainage areas would be targeted with external beam radiation (Holland et al., 2015). Taking this approach helps to prevent the cancer from coming back to that area.

The types of external beam radiation range from hypofractionated to intraoperative to 3D-conformal radiation therapy. When radiation is needed to eradicate cells from a larger cancerous area, hypofractionated radiation is used. With this specific type of external radiation, the client receives larger doses of the drug for approximately three weeks (Whelan et al., 2015). Hitting all the major areas of the breast at once and for a longer period discourages cancer growth (Whelan et al., 2015). Intraoperative radiation therapy or IORT is a single dose radiation that is administered following surgery in the operating room (Veronesi et al., 2015). IORT is not used as widely as it should be because special instruments are needed to administer the radioactive material. Lastly, 3D-conformal radiation uses advanced equipment to target cancerous cells where

the tumor used to be. This type of radiation serves the purpose of sparing the healthy tissue of the breast and decreasing damage to non-cancerous cells (Holland et al., 2015).

Internal radiation, also referred to as brachytherapy takes place inside the body (Polgár & Major, 2009). A device containing radioactive content such as pellets or seeds will be placed within the tissue of the breast and left behind for a brief period of time (Polgár & Major, 2009). There are two types of brachytherapy, one which uses a small catheter-like tube to insert a temporary device into the breast (intracavitary brachytherapy) and the other, which utilizes hollow tubes called catheters to insert pellets into the affected area for several days at a time (interstitial brachytherapy) (Polgár & Major, 2009). Interstitial radiation is older, but it is not used as much as it used to be. In either instance, the results are positive.

Hormone therapy. Hormone therapies are designed to help women with breast cancers that are positive for the hormone receptors estrogen and progesterone and epidermal growth factor receptor 2 (HER-2; Holland et al., 2015). Women diagnosed with triple negative breast cancer will not respond to hormone therapy and drugs that target progesterone, estrogen, and HER-2 (National Breast Cancer Foundation, 2015b). This is because the tumor cells lack these receptors. In most cancers, these receptors are present and fuel cancer growth because normally they aid in healthy cell reproduction and maintenance; this is not so for those diagnosed with triple negative (National Breast Cancer Foundation, 2015b). Instead, chemotherapy is a better option.

Targeted therapy. Targeted therapy utilizes special drugs that inhibit the growth and spread of cancerous cells (American Cancer Society, 2014b). This type of therapy is

different from chemotherapy in that it does not attach all cells (healthy or not); instead it works to combat cells that have a specific cancer-related change (American Cancer Society, 2014b). Even though targeted therapy is new, it shows promise. Not all patients or cancers respond well to chemotherapy, however the results indicate that this treatment method may work even when chemotherapy does not (Holland et al., 2015). Additionally, the side effects are not as harsh as chemotherapy (American Cancer Society, 2014b). The drugs trastuzumab (Herceptin), pertuzumab (Perjeta), ado-trastuzumab emtansine (Kadcyla or TDM-1), and lapatinib (Tykerb) are all approved targeted therapies for women with HER-2 positive breast cancer (American Cancer Society, 2014b). Palbociclip (Ibrance) and everolimus (Afinitor) are approved for women with breast cancers that have estrogen and progesterone positive receptors (American Cancer Society, 2014b).

Female breast cancer susceptibility, mortality, and survivorship risk factors. Many of the risk factors associated with breast cancer cannot be controlled for such as age, genetics, family history of breast cancer, race and ethnicity, breast tissue density, menstrual related factors such as exposure to the hormones estrogen and progesterone, and reproductive or childbearing potential (Boyd et al., 2007). In addition to this, the type of cancer a woman has can influence survivorship. Thankfully, while these things cannot be controlled for, scientists have picked up on which factors tend to influence negative breast changes the most. As time progresses and advancements are made in medical oncology, more information is discovered, and the medical community is able to adjust their approach to testing, diagnosing, and treating breast cancer.

Sex. The female hormones estrogen and progesterone are significant promoters of breast cancer cell growth (American Cancer Society, 2014b). Women have higher levels of both sex hormones than men. Because of this, women are about 100 times as likely to develop breast cancer in comparison to men (American Cancer Society, 2016d).

Age. Approximately 1 in 8 women will develop an invasive form of breast cancer in their lifetime (Nicholas, 2016). The risk for an invasive cancer increases with age. Women over the age of 55 years are more likely than women under the age of 40 to have an invasive breast cancer (Holland et al., 2015; Nicholas, 2016). However, if a younger woman develops an invasive breast cancer, it is likely more aggressive, and the chances of recurrence are greater (National Breast Cancer Foundation, 2015b).

Age is also a significant factor when discussing menstruation or the lack thereof. Women who started their cycle before the age of 12 years have a greater risk of developing breast cancer (American Cancer Society, 2016d; National Breast Cancer Foundation, 2015a). Unfortunately, the earlier a woman starts her menstrual cycles, the longer her exposure to the sex hormones estrogen and progesterone (Boyd et al., 2007; Holland et al., 2015). Because the mass majority of breast cancers are driven by estrogen positive receptors, breast cancer for this group is slightly heightened (National Breast Cancer Foundation, 2015b; Holland et al., 2015). On the opposite end of the spectrum, women who enter menopause later in life (after the age of 55 years) are also at a slight disadvantage (National Breast Cancer Foundation, 2015b; Holland et al., 2015). Again, this has to do with the woman's lifetime exposure to the same sex hormones.

Race and ethnicity. The top three racial or ethnic groups prone to breast cancer are European American, African American, and Latino women (in that order). European American women have the greatest risk of developing breast cancer than any other ethnic group however; they are not as likely to die from it (American Cancer Society, 2015b). According to the American Cancer Society (2015b), the incidence of female breast cancer in 2015 is as follows: White—127.6, Black—123, Asian and Pacific Islander—86, American Indian and Alaska Native 91.7, and Hispanic American American/Latino—91.6. The mortality rate for the same race and ethnic groups are: White—22.2, Black—31.4, Asian and Pacific Islander—11.3, American Indian and Alaska Native—15.2, and Hispanic American/Latino—14.5 (American Cancer Society, 2015b). Keep in mind, these raters are per 100,00 population and based on the overall number for that category (American Cancer Society, 2015b). If the incidence rate is low and the mortality rate is high, a significant percentage of that race or ethnic group is dying from cancer. Compared to minority women, European American women tend to have greater access to resources that scan and test for cancer; they also, on average, attend more doctor appointments where the breasts can be examined for abnormalities (Office on Women's Health, 2010a).

African Americans have the second greatest chance of developing the disease (Office on Women's Health, 2010a). According to the Office on Women's Health (2010a), they are also more likely to die from the disease in comparison to European American, Asian, Native American, and Hispanic American or Latin women. This is because African American women tend to wait longer to receive health services or may

not have access to these valuable resources or insurance to cover costs (Office on Women's Health, 2010a). When the cancerous cells and tumors are found, it is later, and the cancer has progressed to a more advanced stage (Holland et al., 2015). Metastasis is a common occurrence; again, this is partially because the cancer has had the chance to grow without interruptions. The further along the cancer is, the greater the risks become.

Like many African American women, Latino (people of Cuban, Mexican, Puerto Rican, some South or Central American countries, or from other Spanish origin) women face many barriers to good healthcare. It is estimated that in America, approximately 33% of Latino women do not have any health insurance (Office on Women's Health, 2010a). Without insurance, preventative care and routine doctor visits become less of a priority. Quite simply, the costs are too high to comfortably take on. This discourages many within the Latino population from seeing their gynecologist annually, as recommended. Other barriers such as language and cultural values further widen the gap between the patient and the provider (Office on Women's Health, 2010a).

Gene mutations. Anywhere from 5 to 10% of all breast cancer cases are hereditary or genetic; BRCA1 and BRCA2 are mutated genes that are passed down generationally (American Cancer Society, 2016d). In normal cells, the BRCA1 and BRCA2 genes prevent cancer from developing by making proteins that keep the cells healthy; without these proteins, the cells would grow abnormally (American Cancer Society, 2016d). In the mutated versions of BRCA1 and BRCA2, the genes are unable to stop abnormal, unhealthy cell growth, which can in the future lead to the development of cancer (American Cancer Society, 2016d). People with either mutation are at greater risk

for developing breast and ovarian cancer specifically; for those with breast cancer, more times than not, cancer appears in both breasts (Holland et al., 2015).

BRCA1 mutations have an average of about 55 to 65% increased risk for developing breast cancer but rates have been as high as 80% (American Cancer Society, 2016d; Holland et al., 2015). For BRCA2, the risk is about 45% greater (American Cancer Society, 2016d). As mentioned above, the majority of female breast cancer patients are 55 years of age and older, however women with the BRCA breast cancer mutation are frequently younger (under the age of 39 years; Holland, 2015). In addition to this, women with Ashkenazi Jewish (Eastern Europe) ancestry are more likely to have the mutation (although it can be found in anyone; Holland et al., 2015).

Other genetic mutations such as ATM (ataxia-telangiectasia), TP53, CHEK2, PTEN, CDH1, STK11, and PALB2 are also known for increasing the risk of breast cancer in women, however they are very rare and do not pose as great of a threat as the BRCA mutation (American Cancer Society, 2016d: Holland et al., 2015). It is important to note that while the risk for breast cancer is increased, the risk is not an inherited one (Holland et al., 2015).

Family history. Having a close blood relative with breast cancer increases a woman's risk of develop breast cancer herself (American Cancer Society, 2016d; Holland et al., 2015; Nicholas, 2016). The closer the relation, the more significant the correlation. For instance, women who have had a mother, sister, or daughter with breast cancer are doubly vulnerable; if two of these relatives have been diagnosed with any form of breast cancer, the risk increases by three (American Cancer Society, 2016d). For women who

already have or have had breast cancer, the risk of developing a new cancer (separate from recurrence) in the opposite breast or different region of the same breast is substantial (American Cancer Society, 2016d). If the woman is younger than the average age at diagnosis (50+ years), the risk is increased once more.

While it is rare for males to develop breast cancer, having a father or brother with breast cancer also increases a woman's risk for developing the condition in her lifetime (American Cancer Society, 2016d). Approximately 15% of the breast cancer population has had a close blood relation with the same condition. More times than not, those diagnosed with breast cancer do not have a family history (Holland et al., 2015; Nicholas, 2016).

Breast tissue density. The breast is made up of fibrous, glandular adipose (fatty) tissues, each serving a distinct purpose. Women with less fatty tissue in their breasts are said to have denser breasts. Genetics, hormone therapy, pregnancy, one's menopausal status, and age all influence breast tissue density (American Cancer Society, 2016d). Unfortunately, women with denser breasts are one to two times more likely, on average, to develop breast cancer (American Cancer Society, 2016d; Holland et al., 2015). It does not help that denser breast tissue tends to skew cancer tissue and small tumor imaging on mammograms. It is recommended that if a woman has denser breast tissue, testing is done more often, and extra time is spent examining the breasts so that the odds of overlooking potential cancer is lessened (American Cancer Society, 2016d).

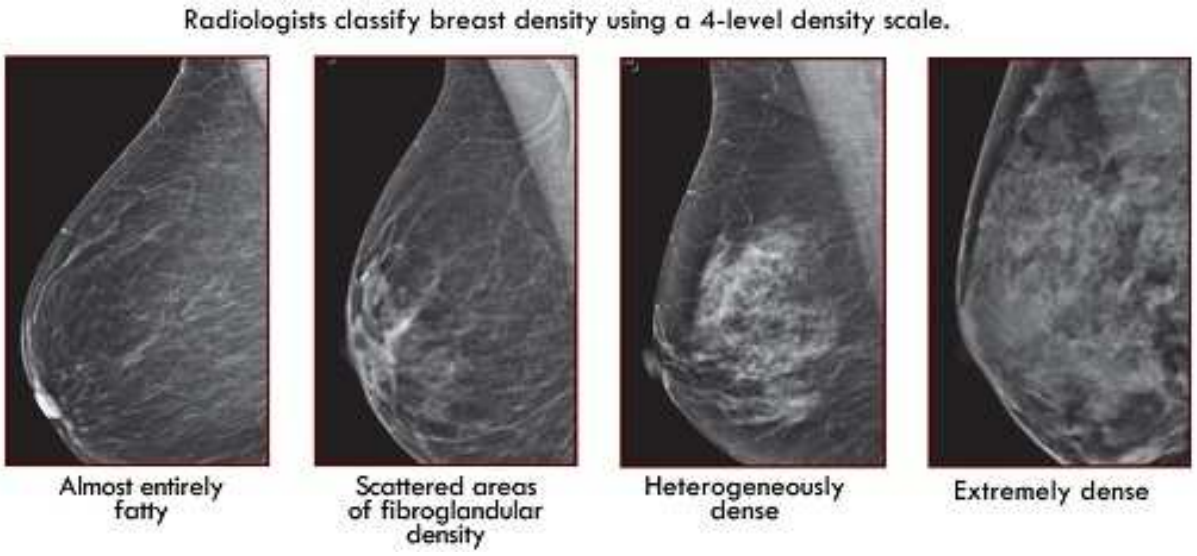

Figure 9. Breast density mammography imaging (Cedars-Sinai, 2016)

In addition to naturally occurring density, conditions that encourage an overgrowth of breast tissue, such as duct ectasia, squamous and apocrine metaplasia, fat necrosis, mild hyperplasia, and fibrosis and or simple cysts, may slightly increase the risk of developing breast cancer; although, many professionals may dismiss these conditions because their influence is so minuscule (National Breast Cancer Foundation, 2015b).

Types of breast cancer with harsher treatability and or recurrence risks. Triple negative breast cancer (TNBC) is more common in women 45 years of age and younger, African Americans and Hispanic Americans, and individuals with the BRCA1 gene mutation (National Breast Cancer Foundation, 2015b). An additional risk factor specific to this type of breast cancer is the difficulty of treatment and its aggressiveness. Because TNBC lacks the three main receptors most commonly linked to breast cancer growth, the number of treatment options decreases (National Breast Cancer Foundation, 2015b). When an appropriate option is discovered, it is typically used aggressively to fight any

progress the cancer has made. If not treated in the initial stages, the cancer is more likely to spread and recur 5 to 10 years after the initial diagnosis (Holland et al., 2015).

Women with ductal carcinoma in situ (DCIS) have a greater risk of cancer recurrence following treatment, although the overall recurrent rate is less than 30% (National Breast Cancer Foundation, 2015b). They also have an increased risk for developing a new breast cancer (of any type) in the previously unaffected breast. Recurrences typically occur anywhere from 5 to 10 years post-initial diagnosis; this is for both invasive and noninvasive types. Those treated with surgery but without radiation therapy thereafter have a 25 to 35% additional chance of recurrence (National Breast Cancer Foundation, 2015b). Adding radiation into the treatment plan decreases these risks by 15%. Fortunately, advancements in detection and treatment for breast cancer are substantial; the long-term survival rate for women with DCIS is close to 100% (Holland et al., 2015).

Metastatic breast cancer (stage IV) is an advanced stage breast cancer that has spread beyond the affected breast into other regions of the body and or organs (i.e. bones, lungs, liver, and or brain; Metastatic Breast Cancer Network, 2016; National Breast Cancer Foundation, 2015b). In 2016 alone, approximately 155,000 Americans have metastatic breast cancer; some 40,000 lost their battle the previous year (American Cancer Society, 2016a). This stage of cancer is difficult to treat and keep up with. Many individuals with a metastatic breast cancer were previously staged with a lower grade (Metastatic Breast Cancer Network, 2016). Unfortunately, recurrence is still a prominent feature of the disease. In a large number of cases, the cancer returns and spreads quickly,

before the patient or survivor's next appointment. The early detection of metastatic cancer does not guarantee a better prognosis or cure; ironically, 20 to 30% of breast cancer patients that were diagnosed with a lower grade (stage I-II) will develop a metastatic breast cancer in their lifetime (Metastatic Breast Cancer Network, 2016).

FOR Susceptibility and Coping in Lung and Bronchus & Female Breast Cancer Survivors

FOR susceptibility in lung and bronchus cancer survivors. Lung cancer survivors, in comparison to breast, colorectal, and prostate cancer survivors, fare the worst with developing FOR (Baker et al., 2005). Lung cancer survivors experience more difficulties coping with and or overcoming complications of survivorship, which essentially leads to the development of FOR. Most survivors are told early on the major risks of having this type of cancer. Specifically, lung cancer is a "roaming cancer" meaning that it tends to spread, most of which is regional. These concerns tend to generate the greatest levels of FOR (DeSantis et al., 2014). For instance, lung cancer survivors typically have longer-lasting physical symptoms following successful treatment; this was shown to increase pain awareness, which led to FOR spikes (Mehnert et al., 2013). Unfortunately, there is a lack of significant FOR evidence on lung and bronchus cancer patients and survivors because statistically speaking, the survival rate is poor.

It is believed that the low survival rate for both short and long-term survivors is also a significant predictor of FOR development; the one-year survival rate is approximately 42% and the five-year survival rate is 15% (American Cancer Society,

2015b). More recent studies have shown an increase in the 5-year survival rate; it is now about 25% for later stage cancers (Linden et al., 2012). For those with lower stage lung and bronchus cancer (stages I-II), the early detection and surgical removal of cancer drastically improves the five-year survival rate; increasing the chances of survival from less than 5% to 70% (American Cancer Society, 2015b; National Lung Screening Trial Research Team, 2011).

These rates mentioned above tend to fluctuate depending on the stage of cancer at diagnosis, treatment type, and recurrence risks and characteristics (localized [non-metastatic] and metastasized). Because only about 10 to 15% of lung and bronchus cancers are detected in the early stage, when much of damage has not been done and the cancer is still curable, many survivors require more aggressive treatments to deter recurrence (National Cancer Institute, 2015a). FOR rates were shown to peak then plateau at higher levels for this particular group of survivors because the survival rate is so devastating (Savard & Ivers, 2013). The unpredictability of the disease is a continuous threat throughout both the treatment and survivorship stages, thus many of those seeking and receiving treatment or learning to live cancer-free are constantly reminded of the potential for regrowth (Berendes et al, 2010; Linden et al., 2012; Savard & Ivers, 2013). Zabora et al. (2001) and Linden et al. (2012) noted that this group of survivors has an overall greater prevalence of psychological distress and anxiety surrounding recurrence compared to all other cancer groups.

During diagnosis, a sizeable number of survivors experienced what was referred to as *subjective anxiety*. This type of anxiety is called subjective because it is based on

individual feelings and concerns that the patient or sufferer is having. These individual feelings or concerns prompt observable symptoms of anxiety such as pain, discomfort, and or abnormal sensations and feelings of uneasiness. In the majority of cases, this type of anxiety is characterized by behavioral, somatic, emotional, and cognitive components. Subjective anxiety tends to come and go depending on the situation (Park et al., 2013). For survivors not receiving some form of active treatment at the time of testing (such as medication that deters cancer cell regrowth), subjective anxiety prompted extreme levels of FOR (Park et al., 2013). Strained patient-physician interactions further encouraged FOR during testing. Regardless of time as a survivor (whether 6-12 months, 12-18 month, or 2-5 years), FOR continued to be a major psychosocial concern in lung and bronchus cancer survivors (Park et al., 2013).

Unlike with some other cancers, the disease stage does not appear to have a positive or beneficial influence on FOR severity; all stages (I-IV) typically produce moderate to high levels of FOR in lung and bronchus cancer survivors (Baker et al., 2005; Kim et al., 2012; Linden et al., 2012). Likewise, the survivor's QoL is greatly impacted by elevated levels of distress caused by FOR (Mehnert et al., 2013). Feelings of dependency and helplessness were most unique and prominent for lung cancer survivors (Baker et al., 2005). Baker et al. (2005) noted disease recurrence as the leading worry for lung cancer patients, accounting for 74.2% of all concerns associated with survivorship. This is corroborated in later studies such as the one conducted by Linden et al. (2012).

Lung cancer patients, especially women, were found to have greater rates of anxiety about recurrence. In terms of depression (a common indicator of FOR), lung cancer survivors surpassed the subclinical threshold (Linden et al., 2012). Linden et al. (2012) revealed that only about 12.9% of bone, breast, gastrointestinal, genitourinary, gynecological, head and neck, hematological, lung, neuroendocrine, prostate, and skin cancer survivors had a clinical level of depression, although the percentages varied from group to group. Of that population, lung cancer ranked the highest with 24.7% of the population meeting the criteria for clinical depression (Linden et al., 2012). As expected, this group also had the highest rate and most severe form of FOR over time.

Not much else is known about the connections between lung and bronchus cancer, recurrence, and FOR development and severity. This is not entirely because of a lack of research in the area. Researchers have made attempts to explore this area of concern but have failed to gather enough long-term information because the survival rate is especially low. With fewer participants in a study over time, the information gathered cannot be generalized and some in cases, the study may be disbanded entirely (Creswell, 2013).

Coping styles of lung and bronchus cancer patients dealing with FOR. Lung cancer treatments are intended to alleviate and or control for physical distress and pain caused by cancer. However, some treatments can prompt adverse responses physically, emotionally, and or psychologically, which in turn may impact how an individual behaves individually and socially (Nicholas, 2016). For many lung cancer patients in general, the physical threat of cancer may seem more dangerous than emotional or psychological detriments; this is not entirely true. The combination of the two can

become very problematic if shaped in the right environment. Extreme stressors often inhibit the body from recovery via immunosuppression (Motz & Coukos, 2011; Myers, 2011). Immunosuppression acts by suppressing or decreasing activity in one or more areas of the immune system—for cancer patients, chemotherapy and radiation treatments spur immunosuppression incidentally (Motz & Coukos, 2011; Nicholas, 2016). When a cancer patient's immune system is already functioning less efficiently than it naturally would, added stressors are able to adversely influence the body's health more rapidly—increasing immunosuppression (Motz & Coukos, 2011). Consequently, FOR becomes more hazardous.

With as many as 40% of cancer survivors reporting moderate-high levels of FOR, it is one the most commonly reported problems by patients with breast, colorectal, lung & prostate cancer (Baker et al., 2005). FOR is not one dimensional—in that it is simply an emotional response (e.g. fear and anxiety inducing) but rather multidimensional because like many mental illnesses or conditions, FOR is triggered by some extreme event and thereafter it takes hold by evoking overwhelming memories and emotions (Anderson et al., 2005). Stress and fear are major obstacles to healing. In chronic illnesses, such as lung cancer, FOR is a catalyst. Fears about recurrence increase the patient's awareness of pain, even those that are nonexistent (Anderson et al., 2005). He or she may also become hypersensitive to minor changes of the body that are not cancer-related, pull away from family, friends, and support systems, and fail to live life wholeheartedly and make goals for the future (Farajzadegan, Khalili, Mokarian, & Morovati, 2015; Mehnert et al., 2013). At a time when the body is as delicate as it is, FOR must be handled as carefully as

possible so that it does not cause any additional harm. The way that the patient handles FOR is entirely dependent on his or her coping strategy and style and the resources (e.g., counseling and medication) made available to him or her.

Coping is an irreplaceable mechanism—it affords us the opportunity to consciously appraise stress so that personal and interpersonal problems can be minimized, tolerated, and or alleviated over time (Myers, 2011). The coping strategies or coping skills that an individual develops in his or her lifetime is heavily dependent on experience (skill level in handling the situation), threat appraisal, and personality (Coon & Mitterer, 2014; Myers, 2011). Two of the most well-known styles of coping are problem- and emotion-focused coping. "The term coping style refers to a more enduring, trait like predisposition to cope with different stressful events in a similar fashion" (Prasertsri et al., 2011, p. 235).

Problem-focused coping targets the problem(s) of the stressful event, thus removing the emotional aspect (Coon & Mitterer, 2014; Myers, 2011). It aims to remove or reduce the root cause to provide a long-term solution. This type of coping style works best in situations where the individual has control over the root problem and he or she is optimistic and has positive expectations about the future (threat appraisal; Coon & Mitterer, 2014; Myers, 2011). In scenarios where the patient is unable to control the root problem, problem-focused coping is not helpful.

Emotion-focused coping does the exact opposite of problem-focused; using this type of style reduces any negative emotional responses caused by the root problem (Coon & Mitterer, 2014; Myers, 2011). For individuals with problems that lie outside of their

personal control, this is a more realistic option. Emotionally focused coping styles include but are not limited to distraction, prayer, meditation and mindfulness, drinking alcohol and using drugs, cognitive reappraisal, and emotional suppression (Myers, 2011). As one can see, not all emotion-focused coping styles are appropriate; unlike problem-focused coping, emotion-focused has greater risks over time. Suppressing emotions over time can compromise immune function and competence and lead to poorer health (Motz & Coukos, 2011). For lung cancer patients, there is always going to be an emotional aspect to the problem (cancer), so it may not be appropriate to solely practice this style of coping but instead use it in combination with problem-focused.

In Kuo and Ma's (2002) examination of NSCLC patients, problem- and emotion-focused coping were used jointly by the mass majority of the population. Overall, more lung cancer patients attempted and favored problem-focused coping, but it was not always the most appropriate or useful technique to alleviate concerns and fears (Kuo & Ma, 2002). Having lung cancer is not something that can be controlled for however, symptom distress caused by FOR and the cancer can be shaped psychologically to become less influential. How the person chooses to approach this specific angle of the problem (problem- and or emotion-focused) is up to him or her.

Kuo and Ma (2002) found that lung cancer patients with a higher education tended to use problem-focused coping more often to combat symptom distress; the lower the education level, the more frequent he or she used emotion-focused coping to deter symptom distress. Women with higher education levels, who were nonsmokers, had no tumor recurrence, lived with family during treatment, and had received chemotherapy

had significantly higher rates of problem-focused coping (Kuo & Ma, 2002). On the other hand, women who were religious, had a lower monthly income, had a tumor recurrence, and were nonsmokers used emotion-focused coping at a greater rate (Kuo & Ma, 2002). Ironically, these biopsychosocial differences weakened as symptom distress severity grew, causing major changes in coping style. As the severity of psychological symptom distress increased, so did emotion-focused coping for both groups (Kuo & Ma, 2002).

Emotion-focused coping done incorrectly can increase the risk for maladaptive coping. Maladaptive coping techniques such as avoidance and repression delay progress by encouraging the cancer patient to ignore, escape, and suppress painful thoughts, feelings and worries, and memories (Prasertsri et al., 2011). Avoidance coping's adverse effects include increased stress and anxiety and deteriorating health. For people with prior health conditions such as cancer (physical illness) and depression or generalized anxiety disorder (mental illness), symptoms may become more pronounced (Prasertsri et al., 2011).

Prasertsri et al. (2011) noted that lung cancer patients who used repressive coping were less likely to report negative emotions and more likely to "conceal awareness of threatening affective information" (p. 238) by intentionally forgetting negative emotions that inhibited their ability to feel safe and unthreatened. When pain was factored into the equation, coping strategies changed and the adjustment of living with cancer sometimes faltered or weakened, inevitably allowing stressors to increase overtime and potentially become worse (Prasertsri et al., 2011). And yet, repressive coping is not the worst

possible coping style of patients and survivors with lung cancer struggling with pain and FOR, pain catastrophizing is.

Pain catastrophizing is a negative cognitive-affective response to pain, both anticipated and existing (Quartana, Campbell, & Edwards, 2009). It is a tendency to exaggerate and magnify pain based on irrational fears or a negative forecast of upcoming events (Quartana et al., 2009). Per Quartana et al. (2009), patients that engage in pain catastrophizing may develop increased sensitivity to pain stimulus, feel more vulnerable than usual, have more pain-related thoughts, are hyperaware of their bodies, and often anticipate painful bodily sensations. All of these factors increase the risk for developing FOR or increase the strength of FOR symptoms in patients in survivors struggling with the condition already (Park et al., 2013).

Avoidance, repression, and pain catastrophizing are not the only coping styles of lung cancer patients, but they are common enough to cause concern. It should be noted that because of the severity of lung cancer, maladaptive coping styles are sometimes an innate response to unwelcome news, especially life-threatening news. Mehnert et al. (2013) stated that: "…our findings strengthen the notion that increased levels of FCR are at least partially subjective emotional responses caused by poorer prognosis and a real threat to a patient's life" (p. 1107). However, with assistance, lung cancer patients and survivors can develop and or strengthen appropriate coping mechanisms to address FOR concerns.

Finding balance, learning techniques to alleviate stress such as journaling and aerobic exercise (if physically possible), staying informed about your health, engaging in

religious and spiritual practices, and attending individual and group counseling are some of the most commonly suggested techniques to deter FOR (Henoch et al., 2007). In Henoch's et al. (2007) study, the correlation between coping capacity and QoL is fairly strong. As coping and QoL increases, FOR related symptoms decrease. Prayer, in Meraviglia's (2004) study, reduced symptom distress and improved psychological well-being in lung cancer patients, accounting for 10% of the variance in psychological well-being scores. CAM (complementary and alternative medicine) therapy users with lung cancer generally are better off than non-users (Wells et al., 2007); common CAM therapies include herb and tea use, acupuncture, massage, meditation, and prayer.

In Well's et al. (2007) study of female NSCLC cancer patients practicing CAM therapies, those who practiced tended to fare better physically and psychologically than those who did not. Mind-body therapies such as prayer were the most commonly used methods of practice to deter ailments (Wells et al., 2007). Self-help techniques were used more regularly as they were the easiest and most convenient. When disease progression worsened, the women were less likely to leave home and engage in massages and acupuncture to relieve stress (Wells et al., 2007). Unfortunately, the authors also found that metastases and undergoing treatment decreased the likelihood of CAM use to deter symptom and psychological distress (Wells et al., 2007). With lung cancer being such an aggressive cancer, the likelihood of CAM therapy being used throughout the treatment processes is low. So again, it seems that the severity of illness has a negative influence on coping capacity and FOR maintenance.

An individual's coping capacity is fluid—meaning that it is ever-changing and heavily dependent on the experiences he or she is going through, and the resources made available to him or her in times of need (Henoch et al., 2007). For someone with a life-threatening disease or condition with limited survival, such as lung and bronchus cancer, the capacity to cope may not come as naturally as it would in less severe circumstances. Patients with lung cancer have demonstrated various coping strategies, many of which become more apparent as distress and FOR deteriorate; this is because interventions (coping styles) are amendable (Henoch et al., 2007). FOR interventions should therefore use specific coping strategies that meet the individual needs of the patient or survivor, not the general population.

FOR in female breast cancer survivors. An unsettling percentage of long-term female breast cancer survivors experience moderate to high levels of FOR years after successful treatment (Koch et al, 2014). Late recurrences—occurring five plus years after recovery, and disease progression are both greater threats for invasive breast cancer survivors; because some breast cancer cells are difficult to detect, find, and flush from the system (Koch et al., 2014). If the cancer returns, it is either localized (within the same area) or metastatic (spread to another part of the body) or there is a secondary cancer in a different part of the body. In instances where recurrence and metastasis occur, a prognosis of advanced cancer is given.

Many of the risk factors associated with breast cancer cannot be controlled for. The most influential risk factors associated with breast cancer development include age, genetics, family history of breast cancer, race and ethnicity, breast tissue density,

menstrual related factors such as exposure to the hormones estrogen and progesterone, and reproductive or childbearing potential (Boyd et al., 2007). Because there is nothing that can be done to alleviate or alter these characteristics, many women may feel uncertain, helpless, and or highly concerned about their chances of getting the disease or if they already have it, their future and QoL post-treatment. This is especially true for female breast cancer survivors. Worries tend to fluctuate off and on throughout the survivorship stage, more so if the chances of recurrence are greater (Mehnert et al., 2009). This is evident in Mehnert's et al. (2013) evaluation of FOR-related concerns.

Mehnert et al. (2013) found that with continued evaluations (such as testing and monitoring), survivors experienced chronic survivorship symptoms of stress. Physical health, perceived risk of recurrence (FOR), and planning for the future were the greatest worries reported by survivors at least two years post-treatment (Deimling et al., 2006; Mehnert et al., 2013). Despite health improvements and the lack of cancer some years later (between 2 to 5 years), survivors continued to have constant FOR overtime (Mehnert et al., 2013). Mehnert et al. (2013) have shown that a moderate number of long-term survivors (5 years) feared that their cancer had returned. FOR risks increased with age, bodily pain or ailments, adverse social interactions, and slower rehabilitation (Mehnert et al., 2013).

Deimling et al. (2006) reported that having breast cancer predicted greater FOR and depression risks, although most of the survivor's overall QoL was not dramatically compromised. It is important to note however that for some breast cancer survivors, QoL can be adversely affected. Mehnert et al. (2009) discovered that breast cancer survivors

are at greater risk for FOR when they have intrusive thoughts, have avoidance tendencies, experience hyperarousal, have a PTSD diagnosis, and express depressive and active problem-oriented coping styles.

Deimling et al. (2006) stated that having breast cancer or having had it in the past was a significant predictor of FOR at the moderate and high level. Triggers such as mammograms, clinical visits, bloodwork, and visiting healthcare providers sparked fears of recurrence in long-term breast cancer survivors regardless of time since remission (Ziner et al., 2012). Treatment satisfaction is a significant predictor of FOR; patients and survivors with lower treatment satisfaction six to twelve months following treatment had greater or stronger bouts of FOR which in turn decreased QoL measurements (Deimling et al., 2006). Unfortunately, a moderate number of patients go through treatment successfully only to have their cancer come back positive either immediately or shortly thereafter. While the presence of cancer-related symptoms may spark fear, self-efficacy reduces this response to perceived harm or harmful experiences. Ziner et al. (2012) noted that self-efficacy is the leading mediator for recurrence fears, acting almost as a buffer against potential mental threats.

Coping styles of female breast cancer patients dealing with FOR. FOR is a frequent and unrelenting concern amongst all women who have experienced breast cancer; regardless of race and ethnicity, age, socioeconomic background, stage of cancer, cancer severity, length of treatment, and or time in remission (Koch et al., 2014). For many, the fear that regrowth could happen at any time is paralyzing enough to cause concern. Insignificant ailments, news about breast cancer, and minor colds are just some

of the triggers that cause FOR to blossom (Koch et al., 2014). Unfortunately, uncertainty is one of the key components in FOR.

Female breast cancer survivors are occupied by treatment and follow-up appointments for so long that when the treatments stop, and the follow-ups become further apart, there is now more time to worry and fret about the possibility of recurrence; creating a vicious psychological cycle of fear, anxiety, and apprehension. It is common to hear breast cancer patients and survivors say things like, 'maybe I should continue treatment a little longer just to be sure' or 'are you sure you don't want to see me more often for checkups'. Living with a new norm is not always comforting and it takes time to adjust and develop coping styles that help deter worries about recurrence. For the majority, survivorship is a learning process, which includes many hours of self-reflection and coping; coping with life and its ever-changing path. According to Gonzalez et al. (2016), there are eight prominent coping styles of female breast cancer patients and survivors, they include: 1) religion and spirituality (to include prayer), 2) benefit finding (making meaning from the breast cancer experience), 3) fatalism (coping with thoughts of death), 4) fighting spirit (refusing to give up), 5) information seeking (gathering information as a way to empowerment), 6) optimism (having a positive outlook), 7) denial (refusing to accept the cancer diagnosis), and 8) self-distraction. For the purpose of this study, only the first three and last two coping strategies will be detailed; religion and spirituality, benefit finding, and fatalism where the top three most reported coping styles and had the greatest reported significance of any of the coping styles. Denial and self-distraction were the most maladaptive of the coping styles; although they were not as

prevalent as religion and spirituality, benefit finding, and fatalism, the negative effects of maladaptive coping are important to examine.

Positive coping techniques such as mind-body practices (prayer, meditation, having faith, etc.) reduced distress in female breast cancer patients and improved their QoL and psychological functioning (Yoo, Levine, & Pasick, 2014). Religion and spirituality and prayer in particular, are common themes amongst female breast cancer survivors. It appears that this type of engagement helps patients to accept, adjust, and work through the effects of having cancer and completing treatment (Gonzalez et al., 2016; Henoch et al., 2007). Patients and survivors who displace their worries by giving them to God (used in a general, non-denominational way) become more optimistic and hopeful, experience and or report fewer discomforts, feel less regret or free of it, have a better QoL, are less depressed, anxious, and angry (a few characteristics of FOR), and do not feel as alone in their experiences with cancer (Henoch et al., 2007; Levine et al., 2009). This does not imply that the patient or survivor has no support system, such as family and friends, but that she may feel alone even in a crowd. There is a common belief amongst cancer patients and survivors that no one truly knows what they are going through. This reality of hers means that only God is likely to understand all that is bothering her, hence the reason religion, spirituality, and prayer are such routine coping strategies amongst the cancer population (Gonzalez et al., 2016; Henoch et al., 2007).

Benefit finding was the second most commonly used coping strategy of Gonzalez's et al. (2016) research group. Benefit finding is used to address cancer adversity by finding positive meaning in life changes (Gonzalez et al., 2016).

Specifically, prioritizing and catering to the more important things in life such as their personal health, becoming closer to God, reevaluating life, and finding an inner strength through enlightenment (Gonzalez et al., 2016). Cancer can be and often is traumatizing but there is strength in overcoming it. By overcoming this obstacle, breast cancer patients are able to find a new appreciation for their resilience, thus discouraging FOR (Antoni et al., 2001; Carver & Antoni, 2004; Tomich & Helgeson, 2004). Some may even report that they feel compassionate and or altruistic about how they approach life and people altogether. In Antoni et al.'s (2001) study, benefit-finding increase generalized optimism and decreased moderate depression in early-stage female breast cancer patients. Carver and Antoni (2004) backed these claims by noting that 4 to 7 years in the future, female breast cancer patients continued to repot lower distress and depression by practicing benefit finding. In addition to this information, minorities, lower socioeconomic classes, and those with more aggressive breast cancer were more likely to engage and benefit from benefit finding (Tomich & Helgeson, 2004).

Coping with the thought of death as an inevitable end (fatalism) is a complicated coping mechanism. There are several different dynamics to fatalism, all of which could potentially turn negative and deter positive coping. One positive representation of fatalism would be to appraise death as an inevitable end for all people, not just those with cancer. This takes away the idea that cancer will undoubtedly cause death and instead puts focus on things that are controllable like inner strength, psychological well-being, and living life in the moment and to the fullest (Gonzalez et al., 2016). In instances where fatalism becomes a weakness rather than a strength, women are more likely to

embrace the belief that there is nothing they can do to stop what is happening to them (cancer), and that death is fated because of the cancer; when this happens, they are less likely to engage in screenings that would detect breast cancer reoccurrence (Straughan & Seow, 1998). Women may also delay treatment by denying that the treatment will be effective (Facione et al., 2002). Negative fatalism evokes feelings of hopelessness, loneliness, anxiety, depression, and even worthlessness. Based on the information presented by Gonzalez et al. (2016) and Facione et al. (2002), there is a strong likelihood that the mentality negative fatalism creates could encourage FOR development and strengthening (if already present).

As noted by Yoo, Levine, and Pasick (2014), "Negative forms of coping, such as emotional suppression and behavioral disengagement, were more likely to be associated with worse outcomes" (p. 820). Negative coping styles or techniques increased the levels of distress for the women and decreased their chances of survival (Mundy-Bosse, Thornton, Yang, Anderson, & Carson, 2011; Witek-Janusek, Albuquerque, Chroniak, Chroniak, Durazo-Arvizu, & Mathews, 2008). Denial and self-distraction are two additional negative or maladaptive coping mechanisms seen in women with breast cancer, as highlighted in Gonzalez et al. (2016). Maladaptive coping, as it relates to cancer diagnosis, often spawns from disbelief. The longer the disbelief lingers, the more likely that other emotions will begin to surface, which overwhelm the patient. There are two coping *styles* that could easily address such vivid emotions—problem- and emotion-focused coping.

In problem-focused coping, the individual sees the problem(s) as the cause of stress; by focusing on the actual problem, the individual is able to ignore, alleviate, and or remove many of the emotional aspects associated with the dilemma (Coon & Mitterer,

2014; Myers, 2011). By removing the problem, the patient is provided a long-term solution. This type of coping style is for people who feel they are in control and can handle being in control; these people are also often optimistic about the future (Coon & Mitterer, 2014; Myers, 2011). "Patients with efficient problem-focused coping strategies use cognitive skills to solve problems" (Farajzadegan et al., 2014, p. 26). Emotion-focused coping does the exact opposite of problem-focused; this type of style may help to reduce any negative emotional responses caused by the problem (Coon & Mitterer, 2014; Myers, 2011). When the patient feels like the problem is out of their control or they must be helped emotionally before they can adjust and cope, this is a more realistic option.

Farajzadegan et al. (2014) found that female breast cancer patients fared better when they took a problem-focused approach to handling breast cancer-related issues and concerns (potential abilities following treatment, handling family-based responsibilities, marital issues, finances, work, stress, depression, etc.). Because the women could not physically rid themselves of the cancer in that moment, they found other ways to alleviate the problems they had that were cancer-related. Among the problem-focused group where women who liked to embrace religion, talked about their emotional troubles, planned for the future, used humor as an outlet, and engaged in positive reframing. Again, religion was the most used strategy of intervention. Demographically, these women tended to be more educated, older in age, and married (Farajzadegan et al., 2014).

Unlike problem-focused coping, emotion-focused coping strategies were more maladaptive over time (Farajzadegan et al., 2014). Because the actual problem remained unsolved dissatisfaction grew. In the Farajzadegan's et al. (2014) study, self-distraction, venting, self-blaming, denial, behavioral disengagement, inaction, and self-distraction were

the most common traits of the emotion-focused maladaptive coping technique. As noted by Farajzadegan et al. (2014), "Using emotion-focused coping strategies may be helpful in the short term and uncontrollable conditions, but in persistent and chronic stressful situations, use of these strategies will lead to negative consequences for physical and mental health" (p. 27). In the event that things worsened, she would be burdened with more issues and concerns because nothing had been resolved from before; instead, of reassessing the situation and preparing for recovery, the patient becomes less and less assured that she will survive and not fall victim to her condition (breast cancer) and FOR (Farajzadegan et al., 2014).

As seen with lung and bronchus cancer, female breast cancer is just as difficult to cope with. Both cancers have high risks of recurrence, which increases the risk of developing FOR overtime, even in the survivorship stage 5+ years following remission (American Cancer Society, 2016a; Simard et al., 2010). It would be beneficial to assess just how influential cancer type and severity are in the development of FOR. In the event that there are significant correlations between these factors, doctors could further assess how to address these issues with their lung and bronchus and female breast cancer patients. Doing so in advance may help to deter and lessen FOR, allowing the patient or survivor to live a better-quality life.

Summary and Conclusions

As noted previously, this study sought to fill the gap in literature by studying both cancer stage and type and its connectedness to FOR development. The data presented in this literary review are evidence that cancer recurrence fears can be crippling for the cancer population, specifically those with greater recurrence rates and more aggressive types of cancer. FOR concerns should be addressed early on and continued throughout

the rehabilitation and follow-up stages to ensure that coping styles are appropriate and not maladaptive. The need to identify whether cancer type and severity play a role in FOR development is critical for tailoring intervention programs for cancer survivors and patients. Creating and enforcing preventative measures would likely offset or at least prepare the client for many of the recurrence concerns that arise in the survivorship stage.

Chapter 3: Research Methods

Introduction

The purpose of this study was to explore the relationship between cancer severity, cancer type, and the development of FOR in lung and bronchus and female breast cancer survivors. In this chapter, the primary objectives are to discuss the methodology of the study and provide rationale for choosing a multiple regression research design. In addition to these objectives, the following areas are detailed: population, population sampling and sampling procedures, procedures for recruitment, participation, methods and data collection, threats to validity, ethical procedures, and the summary.

Research Question

The research question for this study was formulated based on the lack of information in current literature about how cancer severity and type influence the development of FOR. *Severity* is a multidimensional measurement, focusing on age, stage of cancer (I-IV), and years in remission (American Cancer Society, 2015b; Boyd et al., 2007; Office on Women's Health, 2010a). Type represents the type of cancer the survivor had. In this case, there are only two options: lung and bronchus or female breast cancer, both of which have statistically been shown to have high mortality, recurrence, and FOR rates (American Cancer Society, 2015b; Deimling et al., 2006; Koch et al., 2014; Linden et al., 2012; Mehnert et al., 2013). Psychosocial factors were also included in this study to further explain how these cancer survivors cope with prominent cancer-related psychological and social concerns. The four most reported psychological and social issues of lung and bronchus and female breast cancer patients are depression and

anxiety, family life, stability, and spirituality or religion (Mehnert et al., 2013; Park et al., 2013; Prasertsri et al., 2011).

RQ 1: To what extent does the relationship between cancer type and severity influence the development of FOR in lung and bronchus and female breast cancer survivors when controlling for ethnicity, education, and gender?

$H_0$1a: There is no significant relationship between cancer type as it relates to the development of FOR in lung and bronchus and female breast cancer survivors.

$H_1$1a: The variable cancer type is significantly correlated to FOR development in both cancer survivor groups: lung and bronchus and female breast.

$H_0$1b: There is no significant relationship between cancer severity as it relates to the development of FOR in lung and bronchus and female breast cancer survivors.

$H_1$1b: The variable cancer severity is predictive of FOR development in both the lung and bronchus and female breast cancer survivor groups.

Research Design and Rationale

Quantitative researchers explain a phenomenon by collecting numerical information and analyzing it with mathematically based methods (Creswell, 2013). This is done by determining the relationship between an independent variable and a dependent variable (or outcome variable) within an environment. Data collected are usually gathered through reliable, structured research instruments. In this research, the quantitative approach was a better fit because it helped to quantify the relationship between FOR development and cancer-related factors (such as type and severity). I had the ability to explore whether the variables being studied are predictive of FOR in the two

separate cancer populations, lung and bronchus and female breast cancer. Unlike with the qualitative approach, I was not attempting to describe and or interpret subjective human behaviors or social interactions. Instead, I used an objective approach that helped me to determine whether a human behavior is consistent and predictable.

Multiple Regression

Researchers may choose to use a multiple regression research design if they want to determine whether there is a relationship between two or more variables without purposely manipulating them. Researchers determine the nature of the relationship by pairing two or more variables together to see if a change will occur. The trends and patterns discovered are naturally occurring meaning, there is no external force to cause or prompt the change (Creswell, 2013).

In correlation research, the researcher is measuring the strength of a relationship between two or more variables. The degree of their strength helps the researcher to see how closely they are connected. Correlational researchers can only recognize and interpret trends based on the data presented; they cannot establish a cause and effect relationship between the variables or factors. For instance, correlation coefficients are statistical values or measures that help to determine whether the variables being studied have a strong sense of *connectedness*. These values lie between +1 and -1; when the value is nearer to +1, there is a strong positive correlation between the variables (Creswell, 2013; Williams, 2007). Coefficients lying closer to -1 tend to have stronger negative correlations; uncorrelated (or neutral) variables have a value of 0 (Creswell, 2013; Frankfort-Nachmias & Nachmias, 2008). According to Creswell (2013) and

Frankfort-Nachmias and Nachmias (2008), when graphed, these values will have a clear positive, negative, or nonexistent trend.

Multiple regression was appropriate for this study because no variables were being manipulated; rather, they were being studied as they would naturally occur in a setting without a researcher or research taking place (Creswell, 2013; Williams 2007). In short, regression shows the form of the relationship between two (or more) variables and the correlation quantifies the strength of the association. Once the researcher has identified how the multiple independent variables interact with the dependent variable, the information about the independent variables can be used to make more accurate predictions about why things are happening the way they are (Higgins, 2005). In prior studies, researchers have hinted at the possibility of a predictive relationship between cancer severity and type and FOR development (Mehnert et al., 2013). However, little to no research has been conducted to confirm or deny the relationship between the inputs and outputs. Using this method helped to fill in the gaps presented in the field.

Constraints

The only constraint for this study was time. There was a time restraint or limitation for the completion of a doctorate degree. Although I did not foresee any major threats, if I am unable to complete the study and analysis within the next 3.5 years, an extension may need to be filed with Walden University. As it relates to the cost of surveying, the company has several affordable survey options, all of which are feasible for an extended period, if needed. Outside of this, no other time or resource constraints were foreseen.

Methodology

Population

The important feature of the population is having participants who are either lung and bronchus or female breast cancer survivors. Because the focus of this study was on FOR development in these two cancer groups, it was necessary to have one of the cancers in order to participate. Participants must also be in complete remission (also referred to as complete response). For both lung and bronchus and female breast cancer patients, complete remission entails not having any signs, symptoms, or evidence of cancer within the body after being physically examined by a doctor (Aupérin et al., 1999; Slotman et al., 2007; von Minckwitz et al., 2012). Tests used to make this diagnosis include CT, MRI, and PET scanning. When a patient enters the complete remission stage, the cancerous cells and growths have responded to treatment positively, to the extent that the presence of the cancer is nonexistent (Aupérin et al., 1999; Slotman et al., 2007; von Minckwitz et al., 2012). Because there is the possibility of cancer recurring, some doctors may give the patient a diagnosis of no evidence of disease (NED). For cancers that have higher recurrence rates, such as lung and bronchus and female breast, NED may be the preferred terminology. Over the years, remission has become synonymous with cured, which is a misrepresentation. Complete remission does not mean that the cancer has been cured, only that the tests made available for detecting cancer have been unable to find cancerous growths and cells (Aupérin et al., 1999; Slotman et al., 2007; von Minckwitz et al., 2012). The true test is waiting the preliminary 5 years post complete remission to see if the cancer will recur. During this period, oncologists complete routine

screenings to ensure early cancer detection, in the event it was to recur. If it does not, there is a strong likelihood that the cancer will not redevelop in the following years; however, there is no guarantee.

It is preferred that the participants be in remission no longer than 5 years. For both populations, recurrence tends to occur 2 to 3 years following successful treatment; however, many oncologists use the 5-year plan to closely and routinely monitor the body for cancer recurrence and metastasis (American Cancer Society, 2013, 2015b; DeSantis et al., 2014; National Cancer Institute, 2015a, 2016). After 5 years, the risk of recurrence decreases significantly. Although cancer can reoccur or metastasize at any point, it is less likely (Brewster et al., 2008; Senthi, Lagerwaard, Haasbeek, Slotman, & Senan, 2012). For lung and bronchus cancer patients, the risk of recurrence and death is greater throughout the 5-year plan; this has to do with the severity of the cancer at diagnosis, most of which is later stage (II/III-IV) and harder to treat and keep in remission (Senthi et al., 2012). With the study being FOR-focused, the potential for data collection is at its greatest when the survivors are within the 1-5-year range of remission. In addition to these characteristics, there are other demographics that qualify the participants for participation. They include age, gender and sex, race and ethnicity, and languages spoken.

Age. Age limitations applied for this study. In either population, the preferred age range was 25 years and older. The Centers for Disease Control and Prevention (CDC, 2015a, 2015b) revealed that the greatest age-related risk for developing lung and bronchus and female breast cancer were those between 50 and 70 years of age; however,

researchers have discovered that younger populations are being impacted by cancers and at a steadier rate (National Breast Cancer Foundation, 2015b; Sen, Kaya, Erol, Savas, & Gonullu, 2008). A younger age upon diagnosis often implies a more aggressive cancer with greater recurrence risks (Brewster et al., 2008; National Breast Cancer Foundation, 2015a).

To represent the current lung and bronchus and female breast cancer populations, younger participants were included. These participants were approximately two standard deviations from the lowest average age at diagnosis (50 years), making them anywhere from 25-to 37-years-old at the time of diagnosis. One of the goals of this study was to determine if the severity of a cancer has an impact on FOR development. Because age is a measurement of severity in this study, excluding the younger age group could significantly affect the findings of the research.

Gender. As it pertains to gender, there were no limitations for the lung and bronchus cancer population. Both populations have high occurrences of lung cancer and are almost equally impacted by the disease throughout the life span (American Cancer Society, 2015b, 2016). As shown by the American Cancer Society (2016) from the year 2005 and onward, lung and bronchus cancer has ranked number one as the deadliest cancer for both men and women; in 2005, the estimated number of new cases was almost equal to the number of estimated deaths (men—93,010 and 90,490, women—79,560 and 73,020; American Cancer Society, 2005). This trend has continued throughout the years and still holds true in 2016 (new cases—117,920 men and 106,470 women, deaths—85,920 men and 72,160 women; American Cancer Society, 2016). Lung and bronchus

cancer is a significant threat to both males and females; therefore, it was an appropriate choice to use both females and males in the study. By doing so, I fairly represented the lung and bronchus cancer population as it exists in the real world.

There are stricter limitations for the second cancer population, hence the distinction female breast. Breast cancer, as noted by the American Cancer Society (2016), impacts women more frequently and is one of the greatest cancer threats to women. This does not mean that male breast cancer is unimportant but as Baker et al. (2005), Taylor et al. (2011), and Mehnert et al. (2013) noted, greater health risks and threats (as it relates to cancer recurrence and mortality risks) often produce greater FOR occurrences; this is relevant for females who face greater breast cancer risks throughout their lifetime.

Race and ethnicity. Individuals of any race or ethnicity were allowed to participate in the study. There were no limitations within either survivor group that would permit an exclusion. The focus of the study was on determining the effect cancer type and severity have on FOR development. Once the target sample was established, the unit was defined (for example, characteristics of the population such as race and ethnicity).

Languages spoken. Participants must be proficient (fluent) in English, both speaking and writing. All information and material given throughout the extent of the study was English-only. If communication (verbal and or written) was required between the participant and researcher, it was conducted in English. Although I can speak Patois and some Spanish, I am not proficient. Speaking English helped to prevent

miscommunication and misunderstanding between parties, which should prevent findings from being skewed or misrepresented. If the participant did not identify him or herself as proficient in English, he or she did not qualify for participation.

Sampling and Sampling Procedures

In quantitative research, sampling involves the process of selecting a choice group of individuals within a population to represent the whole. This choice group of individuals should have characteristics not only specific to the overall population but also to the research they are participating in (Gall et al., 2003). The researcher is able to get a true representation of the overall population (also known as a representative sample; Frankfort-Nachmias & Nachmias, 2008). It is important for researchers to continue this trend as they recruit participants, keeping in mind that the more representative a participant is, the greater the chance the researcher can generalize his or her findings to the overall population.

In this study, the populations being analyzed were lung and bronchus and female breast cancer survivors. With FOR being the focus of this research, these two populations have the greatest potential to yield noteworthy information. Per the statistical information outlined by the American Cancer Society (2016), lung and bronchus and female breast cancer pose the greatest threats for cancer recurrence. Not only do these cancers have greater recurrence rates, they are also the most lethal; from the year 2015 to 2016, approximately 16% of breast cancer patients and 70% of lung and bronchus cancer patients died from the disease (American Cancer Society, 2016). It is

crucial that the manner in which the participants were chosen was calculated—purposeful and prespecified (Creswell, 2013; Gall et al., 2003).

Nonprobability, purposive sampling. Nonprobability sampling is a technique that does not rely on randomization—randomly selecting participants. Instead, other techniques are used to uphold representative sample standards. In nonprobability sampling, the researcher chooses participants who have specific characteristics deemed important by the researcher (Creswell, 2013). These characteristics have an impact on the outcomes of the experiment; ignoring such critical features could mean risking the credibility of the work as well as weakening the study itself (Frankfort-Nachmias & Nachmias, 2008).

This does not mean that the population cannot be diverse as it pertains to some characteristics such as age, ethnicity, and gender; however, individuals typically have one or more shared similarities, which is dependent on what the researcher needs to create a relevant research (Creswell, 2013; Frankfort-Nachmias & Nachmias, 2008). For a study that was focused on the phenomenon of FOR as it relates to two cancer types with varying severity, random sampling was not feasible.

Sample size and power analysis. A sufficient sample size entails having a population large enough to identify statistically significant changes in a study if one truly exists. In any study that wants to make conclusions about effect, an appropriate sample size must first be determined (Munro, 2005). In this study, a linear multiple regression power analysis was conducted using G*Power 3.1.9.2 to determine a sufficient sample size (Faul, Erdfelder, Buchner, & Lang, 2014). This was done by inputting a power value

of 0.80, a large effect size of 0.35, a level of significance of 0.05, and seven predictor variables. With an α of 0.05, the chance of the null hypothesis being rejected when it is in fact true is 5% (Munro, 2005). Cohen (1992) used a value of 0.15 to signify a medium effect size and 0.35 for a large effect size. In McGinty, Goldenberg, and Jacobsen's (2012) study, a medium-large effect size of 0.22 was adequate for quantifying the differences between two groups of breast cancer patients with different coping appraisals. With there being a limited number of researches conducted on lung and bronchus FOR coping techniques, I was unable to find an article documenting effect size. For the purpose of this study, Cohen's large effect size was used for both groups to help quantify the number of participants needed for each cancer population.

There were a total of 14 independent variables, all of which were categorized into three main groups—the type of cancer, the severity of the cancer, and psychosocial factors. In addition to this were the control variables—ethnicity or race, education, and gender. When studies have categorical variables, each category must be treated as a separate dichotomous variable during analysis (Creswell, 2013; Frankfort-Nachmias & Nachmias, 2008). With these parameters set, the estimated minimum sample size was N = 48 per cancer population. This means that a minimum of 48 lung and bronchus and 48 female breast cancer survivors were required to achieve a power of at least 80%. To increase the power of the study, more participants may be recruited especially if there are significantly fewer participants in either of the cancer groups. I stopped reviewing here due time constraints. Please go through the rest of your chapter and look for the patterns I pointed out to you. I will now look at Chapter 4.

Procedures for Recruitment, Participation, and Data Collection

Recruitment procedures. Participants were recruited via the Internet with the help of a surveying website®, support groups, and the Walden University participant pool. The Internet is an efficient option for recruiting because more cancer survivors can be reached with minimal efforts. Nationwide, there are several organizations that offer support for cancer survivors solely online. While there may be on-ground facilities, the Internet helps to keep lines of communication open between patients or survivors and the treating physician. Tapping into this resource would likely help to bring in survivors that would otherwise be difficult to find and or reach. If the organizations agreed to help with the recruiting process, permission will be needed, which entails getting approved letters of cooperation.

Recruiting female breast cancer survivors appeared to be less difficult than recruiting for lung and bronchus cancer survivors, this was because the survival rate was high, and the mortality rate was low. With there being such a high survival rate, greater effort has been put into creating support groups nationwide and internationally. Recruiting lung and bronchus cancer survivors over the Internet helped to offset some of the difficulty associated with finding such a small population group. While the lung and bronchus cancer group was substantial, finding and maintaining the population size has proven to be difficult in previous research (Deimling et al., 2006). The trouble in recruiting for this group is that the mortality rate is high following treatment, especially in the first five years of the survivorship stage (Linden et al., 2012). The Internet helped to alleviate this primary area of recruiting concern.

There were limitations to recruiting on the Internet. Individuals who were unfamiliar with or did not use the Internet were unable to participate. The survey was only administered online. All information gathered would be disclosed by the participant on the site which means that no confidential information would be gathered beforehand because there was no prior contact between the participant and the researcher. All qualifying information for participation was given at the start of the survey. If these qualifications were not met, the individual will be unable to continue and complete the survey, thus illuminating their information altogether.

Provision of informed consent. Informed consent was obtained prior to data collection and analysis via the surveying site. Participation was voluntary for this study. Prior to the start of the study, participants were given a single document, approved by the Walden IRB, explaining (a) the purpose and intent of the study, (b) procedures involved, (c) his or her rights as a voluntary participant, (d) a full confidentiality agreement, (e) the risks of participation, and (f) the anticipated duration of participation (IRB approval #11-07-17-0368157). The consent form also provided the participants with contact information for the researcher. Upon agreement, each participant was asked to virtually agree to the consent form. Agreeing to the terms allowed the participant to begin the FOR-related survey questions. Per the surveying site, the participants could download a copy of the consent form for his or her records.

Mode of data collection. For this research study, I used an online surveying company to collect data. Each participant was electronically administered a copy of the questionnaire to complete. In the beginning of the survey there was an inclusion criteria

section; participants must complete this section in order to start and complete the actual questionnaire. Having this section helps to safeguard against missteps in the recruitment process. Upon completion, researcher information will be provided along with a thank you statement for volunteering. Follow-up statements are not necessary. Once the questionnaire is completed, it will be sent back to the researcher. The researcher is the only individual to receive and review the completed document. Thereafter, data retrieved from the questionnaire will be coded and entered into SPSS for data analysis.

Instrumentation. The FCRI survey, developed by Simard and Savard (2009), will be utilized in this study to capture the multifaceted ways in which FOR impacts lung and bronchus and female breast cancer survivors during the survivorship stage. Permission to use this survey in its entirety was granted by Dr. Sébastien Simard. The FCRI survey consists of 42 questions directed at understanding the degree and complexity of FOR in four cancer survivor groups (breast, prostate, colorectal, and lung). Simard and Savard's (2009) goals during survey development were to explore seven areas of primary concern for cancer survivors but to include them under one survey instead of several; these areas include *triggers* (8 items), *severity* (9 items), *psychological distress* (4 items), *coping strategies* (9 items), *functioning impairments* (6 items), *insight* (3 items), *and reassurance* (3 items). They also utilized the participants' demographic information to help highlight differences amongst groups based on *age, sex, cancer site(s) (breast, prostate, colorectal, and lung), recurrence type (localized vs. metastatic), treatment type (surgery, radiotherapy, and chemotherapy), and time since diagnosis* (Simard & Savard, 2009). For the seven areas of primary concern, each question (per

category) was rated on a Likert scale from 0-4; 0 is understood as, the survivor "not at all or never" had the thoughts or feelings outlined in the question, whereas 4 represented thinking of or feeling them "a great deal or all the time".

Simard and Savard (2009) reported satisfactory validity and reliability of the FCRI scale with a Cronbach alpha value of 0.95 for the overall scale. Construct, concurrent, divergent, and discriminant validity were all reported as being strong when measured against other, previously validated instruments. When looking at construct validity, Simard and Savard (2009) evaluated the FCRI scaled by converging it with other FOR scales in the field, such as CARS (Concerns About Recurrence Scale; Vickberg, 2003) and FRQ (Fear of Recurrence Questionnaire; Northouse, 1981). Correlations between the two subscales showed an alpha value range between 0.93 to 0.97 (Simard & Savard, 2009).

Concurrent validity was proven by calculating correlations "…between FCRI scores with anxiety and depression scores (i.e., HADS [Hospital Anxiety and Depression Scale]; Zigmond & Snaith, 1983) and with intrusion and avoidance scores (i.e., IES [Impact of Event Scale]; Horowitz, Wilner, & Alvarez, 1979)" (Simard & Savard, 2009, p. 245). These correlations yielded an alpha value of 0.82 and 0.81 for HADS and 0.88 and 0.84 for IES respectively (Simard & Savard, 2009).

The QLQ-C30 + 3 (European Organization for Research and Treatment of Cancer Quality of Life Questionnaires; Aaronson et al., 1993) scale was used to measure divergent validity. This was done by assessing FCRI divergence with the QoL measures: physical functioning, role functioning, cognitive functioning, social functioning, and

global QoL (Simard & Savard, 2009). Correlations per the FCRI and QLQ-C30 +3 factors yielded an alpha value range between 0.65 and 0.92 (Simard & Savard, 2009). And lastly, the cancer patients' demographic and medical characteristics were used to help assess correlations as it related to FCRI scores. In doing so, Simard and Savard (2009) were able to prove discriminant validity. Significant correlations were found in patients who were younger in age, female, had received chemotherapy, radiotherapy, and or surgery, and had either localized or metastatic cancer progression (Simard & Savard, 2009).

Demographic questionnaire. The demographic questionnaire consisted of questions pertaining to sex, age, race and ethnicity, marital status, education attained, cancer site, years in remission, and cancer severity (stage I-IV; Appendix A). These specific demographic categories were used to help develop a clearer profile of the cancer survivor participants. Doing so helped to ensure that the sample was representative of the larger, real world sample. Of the variables noted, only sex, age, cancer site, years in remission, and cancer severity were part of the research analysis, helping to clarify the relationship between the control, independent and dependent variables.

Threats to Validity

External Validity

The greatest threats to external validity was having a non-representative sampling and non-representative research context (Creswell, 2013; Frankfort-Nachmias & Nachmias, 2008). In the first, the participants should be representative of the group or population being studied. This means having a sampling that closely mirrors the true

population being studied (Creswell, 2013; Frankfort-Nachmias & Nachmias, 2008). In the latter, researchers want to ensure that generalizations cannot only be made from the sample to the true population but also across settings or contexts and time (Creswell, 2013; Frankfort-Nachmias & Nachmias, 2008).

In this study, inclusive characteristics for the population include cancer type, cancer stage, age, gender and or sex, and being a cancer survivor. To ensure that the sample was representative of the true group, these specific characteristics were accounted for in the recruitment process. This was also taken into consideration when deciding the sampling strategy; hence the reason a non-probability purposive sampling strategy was executed. While there are a few restrictions on the 'type' of participant allowed, these restrictions were crucial in upholding the confidence for shared characteristics of the true population.

Generalization across populations. As it pertains to generalization per cancer population, that can be more complex to achieve depending on the type of study. It is important to note that each population (lung and bronchus and female breast) was examined separately; two regression tests were conducted in this study, one for each cancer population. In general, my objective was to be able to make generalizations across similar populations, settings or contexts based on the original data. This means taking a closer look at the new population and seeing if it is sufficiently similar enough to generalize the information (Laerd Dissertation, 2012). While similarities are important to focus on, the differences may be the fault that does not allow the researcher to generalize

information. Looking at this study's features, generalization was not entirely obtainable; the reasons are numerous.

Each cancer has its own set of features when it comes to prognosis: severity, mortality rate, recurrence rate, etc. These features in turn shape how the patient or survivor handles and adapts to having cancer. Lung and bronchus and female breast cancer survivors were chosen as the study's focal populations because they are statistically at greater risk for recurrence and mortality. As noted by Mehnert et al. (2013) and Deimling et al. (2006), the greater the thought of risk is, the stronger the fear may become. Without the same level of risk, the fear of cancer recurrence may not register in the same manner regardless of how similar the cancer survivors are. The cancers alone are too dissimilar to attempt generalization based on population. With that being said, it was possible to generalize within the same populations (for instance, lung and bronchus cancer survivors of this study and the general lung and bronchus cancer population).

Internal Validity

For researchers, internal validity helps to substantiate that only the independent variables are responsible for the changes that occur to the dependent variable. This can only be proven when there is adequate control of extraneous variables. When there is better control within the research design, internal validity tends to be greater.

Selection bias. Selection bias played a unique role in this research because the individual differences between the two cancer groups played a key role in analyzing the changes that occurred to the dependent variable, FOR. Typically, randomization ensures

that the sample obtained is diverse enough that it is representative of the overall population (Frankfort-Nachmias & Nachmias, 2008). For this experiment, randomization was not an appropriate fit. Instead non-probability, purposive sampling was chosen because it helped to control which independent variables were needed to successfully explore the relationship between cancer type, severity and FOR. As noted previously, this does not mean that the population cannot be diverse, as it pertains to some characteristics such as age, ethnicity, gender, etc. However, individuals typically have one or more shared similarities, which are dependent on what the researcher needs to create a relevant research (Creswell, 2013; Frankfort-Nachmias & Nachmias, 2008). With that being said, precautions were taken in this study to ensure that the populations being explored were representative of the true population.

Statistical Conclusion Validity

Statistical conclusion validity assesses the degree to which the null hypothesis can correctly be regarded as truthful (Cohen & Swerdlik, 2004). As outlined by Cohen and Swerdlik (2004), statistical conclusion validity ensures that the researcher is utilizing an appropriate sampling strategy, has considered the most appropriate statistical tests, and has chosen the most reliable measurement procedures. When the following criteria were used as an outline and were fitting, based on the needs of the research study, the researcher was then able to establish the existence and the strength of variation between variables, to include cause and effect (Cohen & Swerdlik, 2004).

To ensure that the treats to statistical conclusion validity remained minimal, special attention was paid to the following areas: statistical power, sample size, effect

size, and statistical tests. According to Trochim, Donnelly, and Arora (2016), one way to improve this type of validity is to have a statistical value of 0.8 or greater. A value of 0.8 implies that the researcher has an 80% chance of finding a relationship between variables when one truly exists (Trochim et al., 2016). In this study, a value of 0.80 was used, per recommendation. Statistical power is also affected by other factors such as affect power.

Affect power becomes more reliable when the population or sample size increases, which yields more data (Trochim et al., 2016). The minimum sample size for this study was 96 participants, however the surveying site allowed for a greater allotment of submissions if needed and as requested by the surveyor or researcher. While the objective was to target as many appropriate participants as possible within a certain timeframe, there was a possibility that fewer lung and bronchus cancer survivors would complete the survey. As discussed previously, the mortality rate for lung and bronchus cancer is significantly higher than most other common cancers. If this problem occurred, the solution was to reconsider the timeframe of the study and change it accordingly. Also, by making the survey available via the Internet, my hope was to have a greater reach than surveying locally.

For this research study, a large effect size of 0.35 was utilized to increase the noticeability or salience of the relationship(s) between variables. While Faul et al. (2014) recommends a minimal value of 0.15 for the social sciences, researchers McGinty et al. (2012) successfully completed a similar study on FOR with an effect size of 0.22. This slight increase in effect size could potentially help to amplify the signal of interconnectedness between variables and essentially provide more significant data for a

greater analysis (Trochim et al., 2016). Lastly, special precaution was taken when deciding which instrument to employ. Simard and Savard's (2009) FCRI scale was specifically developed for exploring issues associated with FOR in cancer patients and survivors of varying groups (such as cancer type, stage, age, etc.). Not only is the instrument specifically designed for populations such as those listed in this research study, it was developed based on the assessments of longstanding, preexisting FOR studies that have been proven valid and reliable (Aaronson et al., 1993; Horowitz et al., 1979; Northouse, 1981; Vickberg, 2003; Zigmond & Snaith, 1983). While there are other FOR scales available, only Simard and Savard's scale was comprehensive enough to detail all of the areas of interest specific to this study (cancer severity and type and their relationship with FOR development).

Ethical Considerations

In this study, human participants were used. It is crucial that all participants were aware of their rights and were at no point exposed to harm. In an effort to uphold these standards, participants were told from the very beginning that their participation was voluntary, and, in any instance, they were welcome to withdraw from the study with no fear of penalty. Additionally, all information obtained throughout the study was kept private, confidential, and secure. All information collected throughout the study was saved to and maintained on a password protected external hard drive. Only the researcher had access to the external hard drive and the password, which protects the information on the drive. Per Walden guidelines, all information will be kept up until 5-years, afterwards all material must be destroyed.

Participants were given my contact information in the event that a question, comment, or concern arises. If one of the participants become emotionally upset while taking the study, he or she was given access to a list of support groups and or therapists to contact for consultation (Appendix C). A copy of the information was added to the surveying site questionnaire but can be delivered via email if asked for. All participants were encouraged to disclose these concerns as soon as possible, if they occurred.

Summary

A multiple regression study design was used for this study. As outlined in chapter 3, I discussed the intentions of the study, eligibility requirements for participation, sampling procedures, sample size, mode of data collections, instrumentation, threats to validity, and ethical considerations to ensure confidentiality. The objective of this research was to explore the relationship between FOR development and cancer severity and type. In order to do that, the dependent variable *FOR* and the independent variables *type*, *severity*, and *psychosocial factors* were explored further. Administering a survey online was the chosen method of data collection. In chapter 4, the data from the survey will be collected, analyzed, and interpreted to determine if cancer type and severity have a significant relationship with FOR.

Chapter 4: Results

Introduction

In this chapter, pertinent information about data collection, screening, and the results of the multiple regression analyses are detailed. The purpose of this study was to explore the relationship between cancer type and severity and the development of FOR. In prior researches, the primary focuses were on the psychological effects patients and survivors endured because of FOR; topics such as mental illness comorbidity and rates of depression, for instance, may have been discussed. Minimal research had been conducted on what uncontrollable cancer-related risk factors put patients and or survivors at risk for FOR development. In this study, the risk factors cancer stage, cancer type, age, and years in remission were explored in relation to FOR development and severity.

As many as 87% of cancer survivors have reported mild levels of FOR but had not been tested and or treated for the condition by their physician (Butow et al., 2015). With greater FOR levels, there are typically increased anxiety and distress levels, a decrease in QoL, more frequent intrusive thinking and maladaptive coping styles, and potentially a weakened immune system and poorer health that accompany (Butow et al., 2015). Lung and bronchus and female breast cancer survivors in remission were recruited to complete the FCRI survey via an online surveying site to provide insight about how cancer survivors appraise their risk of recurrence.

The information gained has the potential to shed light on new and unique risk factors associated with FOR development not previously explored within the cancer populations. Moreover, significant correlations discovered could help physicians to tailor

detection and intervention programs for survivors and patients of cancer experiencing FOR, whether in the treatment or survivorship stage. Chapter 4 starts with a reiteration of the research question and hypotheses; afterwards, descriptive statistics are given, followed up by a detailed step-by-step account of the statistical tests used in the study and an interpretation of those findings.

Research Question and Hypotheses

RQ 1: To what extent does the relationship between cancer type and severity influence the development of FOR in lung and bronchus and female breast cancer survivors when controlling for ethnicity, education, and gender?

$H_0$1a: There is no significant relationship between cancer type as it relates to the development of FOR in lung and bronchus and female breast cancer survivors.

$H_1$1a: The variable cancer type is significantly correlated to FOR development in both cancer survivor groups: lung and bronchus and female breast.

$H_0$1b: There is no significant relationship between cancer severity as it relates to the development of FOR in lung and bronchus and female breast cancer survivors.

$H_1$1b: The variable cancer severity is predictive of FOR development in both the lung and bronchus and female breast cancer survivor groups.

The dependent variable, FOR, was measured using the FCRI scale developed by Simard and Savard (2009). The FCRI is made up of 42 questions, measuring seven subscales or areas of concern for cancer patients and survivors experiencing FOR: triggers, severity, psychological distress, functioning impairments, insight, reassurance, and coping strategies. The independent variable, cancer type, referred to the two cancer

groups being studied, lung and bronchus and female breast, while severity specifically looked at cancer stage, age, and years in remission. Psychosocial factors included the top four most reported psychological and social issues of survivors dealing with FOR: depression and anxiety, family life, stability, and spirituality or religion (Mehnert et al., 2013; Park et al., 2013; Prasertsri et al., 2011).

Data Collection

To ensure that a diverse group (or the truest representation) of study participants were reached, I surveyed and collected data through an online surveying site; administering the survey via the Internet allowed me to reach an array of participants with minimal effort and expenses. This method was also preferable over others because there was some concern that recruiting lung and bronchus cancer survivors would be difficult. As I hoped, administering the survey online helped to keep the rate of completion for both populations comparable.

During the course of 6 months, from November 28th to May 24th, 2018, I was able to collect data from a total of 107 lung and bronchus and female breast cancer survivors. Although the completion rate for the survey was consistently high (94%), there were a few instances where participant responses had to be omitted from the final data breakdown. Most of the omitted information came from participants not meeting the inclusion criteria or failing to complete the survey entirely. Of the 107 total surveys collected, only 105 consented to participating in the study based on the terms approved by the institutional review board. Three participants voluntarily stopped the survey midway and did not complete it, and five others did not meet the age requirement (25+

years). Participant data that did not meet the requirements or the needs of the study were removed from the final analysis. In the end, the overall usable population was $N = 97$ ($N = 48$ lung and bronchus and $N = 49$ female breast). The agreed upon minimum population size at the start of the research was 96 total or 48 participants per population, to achieve a power value of at least 80%.

Descriptive Statistics

Ethnicity and Race

When looking at the data for ethnicity and race, the majority for both the lung and bronchus and female breast cancer populations were made up of Non-Hispanic American (75% for lung and bronchus and 77.6%, for female breast), European American individuals (52.1% and 34.7% respectively). The second greatest ethnic group for the lung and bronchus cancer population was mixed, or two or more races (29.2%). It was expected that the second greatest group would be African American (4.2%) based on the current trends outlined by the American Cancer Society (2016a), but this was not the case. The female breast cancer group stuck to this trend, with African American women being the second largest racial group (32.7%) to be diagnosed (see Tables 1 and 2 for additional ethnicity and race information).

Participant 29 in the lung and bronchus survivor group mistakingly reported being both African American and European American for his or her ethnicity; instead, the correct response should have been two or more races. This information was changed to reflect a corrected response. The same mistake occurred for Participant 19 of the female breast cancer group. The participant reported being Native American and European

American. Her response should have been two or more races; this mistake was corrected before running the analysis.

Table 1

Lung & Bronchus: Demographic Characteristics

	Lung & Bronchus ($N = 48$)	
	%	Frequency
Age Range		
25-29 years	4.2	2.0
30-39 years	22.9	11.0
40-49 years	18.8	9.0
50-59 years	20.8	10.0
60+ years	33.3	16.0
Gender (%)		
Male	68.8	33.0
Female	31.3	15.0
Ethnicity		
Hispanic American, Latin, or Spanish descent	25.0	12.0
Non-Hispanic American, Latin, or Spanish descent	75.0	36.0
Race		
American Indian/Alaska Native	10.4	5.0
African American or Black	4.2	2.0
Caucasian or White	52.1	25.0
Asian	2.1	1.0
Native Hawaiian or Other Pacific Islander	2.1	1.0
Two or more races	29.2	14.0
Other	0.0	0.0

Table 1 (continued)

	Lung & Bronchus (N = 48)	
	%	Frequency
Highest Level of Education		
High School Diploma	43.8	21.0
GED	6.3	3.0
Certificate	4.2	2.0
Associates	20.8	10.0
Bachelors	18.8	9.0
Masters	4.2	2.0
Doctorate	2.1	1.0
Highest Year Completed	0.0	0.0
Other	0.0	0.0
Years in Remission		
Less than 1 year	33.3	16.0
1-2 years	50.0	24.0
3-5 years	14.6	7.0
5+ years	2.1	1.0
Cancer Stage		
I	29.2	14.0
II	39.6	19.0
III	20.8	10.0
IV	10.4	5.0

Table 2

Female Breast: Demographic Characteristics

	Female Breast ($N = 49$)	
	%	Frequency
Age Range		
25-29 years	6.1	3.0
30-39 years	22.4	11.0
40-49 years	12.2	6.0
50-59 years	28.6	14.0
60+ years	30.6	15.0
Gender (%)		
Male	0.0	0.0
Female	100.0	49.0
Ethnicity		
Hispanic American, Latin, or Spanish descent	22.4	11.0
Non-Hispanic American, Latin, or Spanish descent	77.6	38.0
Race		
American Indian/Alaska Native	0.0	0.0
African American or Black	32.7	16.0
Caucasian or White	34.7	17.0
Asian	4.1	2.0
Native Hawaiian or Other Pacific Islander	4.1	2.0
Two or more races	20.4	10.0
Other	4.1	2.0

Table 2 (continued)

	Female Breast (N = 49)	
	%	Frequency
Highest Level of Education		
High School Diploma	24.5	12.0
GED	2.0	1.0
Certificate	2.0	1.0
Associates	24.5	12.0
Bachelors	20.4	10.0
Masters	20.4	10.0
Doctorate	2.0	1.0
Highest Year Completed	2.0	1.0
Other	2.0	1.0
Years in Remission		
Less than 1 year	16.3	8.0
1-2 years	30.6	15.0
3-5 years	20.4	10.0
5+ years	32.7	16.0
Cancer Stage		
I	28.6	14.0
II	40.8	20.0
III	18.4	9.0
IV	12.2	6.0

Age and Gender

Participant ages ranged anywhere from 25 years and onward. In both populations, individuals 50-59 and 60+ years had the greatest response rate; this was expected. In both populations, the rate of cancer onset increases with age (CDC, 2015a, 2015b). For the lung and bronchus population, individuals 50-to 59-years-old reported at a rate of 20.8% and individuals 60+ years made up a third of the entries, 33.3%. Respectively, the rates for female breast cancer were 28.6% and 30.6% for the two oldest groups.

With regard to gender, in the lung and bronchus cancer group, males represented over two-thirds of the responses (68.8%). The remaining 31.3% identified as female. Typically, the incidence rates per 100,000 person-years for male and females is somewhat balanced (66.4 for males and 50.7 for females; CDC, 2018), but for this study, that was not the case.

All participants from the female breast cancer population were female. Being female was an inclusion requirement. Although men with breast cancer were excluded from participation, this does not mean that their experiences were not or are not traumatizing. Males do not have the same rate of cancer onset or recurrence, and male breast cancer is not as lethal as female breast cancer, so their inclusion for this study was insignificant. Of the estimated 231,840 new breast cancer cases in 2015, only 2,350 were for males (approximately 1% of the overall population; American Cancer Society, 2015b).

Years in Remission and Cancer Stage

The variables years in remission and cancer stage often coincide. In most cases, especially for cancers with higher recurrence rates, the greater the cancer stage, the shorter the time spent in remission. In lung and bronchus cancer patients and survivors, the recurrence and mortality rates are exceptionally high. Prior to the start of data collection, there was some concern about gathering enough participants overall, but especially those in remission who had had a high-grade cancer. Having survivors with higher grade lung and bronchus cancer was important because the greater the risk of recurrence, the greater the chance of developing FOR. Their inclusion was crucial for

seeing trends not easily observed otherwise. Fortunately, there were a few responses from individuals in remission 3 years and beyond (16.7%) and had been diagnosed with Stage III (20.8%) or IV (10.4%) cancer. However, as expected, most of the survivors reported being in remission less than 1 year (33.3%) and 1-2 years (50%) and had a lower stage lung cancer—Stage I had 14 respondents (29.2%) and Stage II had 19 (39.6%).

When looking at how treatment advancements have positively impacted recurrence and mortality rates for female breast cancer survivors, it was expected that there would be a greater response rate from long-term survivors in comparison to the lung and bronchus population. The bulk of respondents had been in remission for 1-2 years (30.6%) and 5+ years (32.7%). Stages I and II had a combined population size of 34 participants or 69.4% of the entire group (28.6% and 40.8% separately). Stages III and IV were the most underreported stages; however, their combined rate was admirable; combined, Stage III and IV made up 30.6% of the overall population, with 15 respondents.

Highest Level of Education

When looking at the variable highest level of education, more lung and bronchus cancer survivors had completed their high school diploma (43.8%) than any other category; following behind that was associate's (20.8%) and bachelor's degree (18.8%). The differences in education level were surprising. The CDC (2018) stated that the higher a person's education level is, the less likely he or she is to smoke or be around those who smoke, thus reducing his or her chances of developing lung and bronchus

cancer. According to the CDC (2018), nearly 20 out of every 100 adults with a high school diploma smoke.

For female breast cancer survivors, there was almost an equal breakdown of responses for education: high school diploma (24.5%), associate's (24.5%), bachelor's (20.4%), and master's degree (20.4%). Unlike with lung and bronchus cancer, education typically is not a risk factor, especially on its own. Education, in prior research, was only a risk factor for women with no health insurance and immigrants (American Cancer Society, 2018). Immigrant women and women at a socioeconomic disadvantage were at greater risk for breast cancer development because they could not afford or tended to skip routine appointments that could help detect breast cancer and or had not received a recent mammogram (American Cancer Society, 2018). I stopped reviewing here. Please go through the rest of your chapter and look for the patterns I pointed out to you. I will now look at Chapter 5.

FCRI Subscales. Participant responses to the FCRI questionnaire were measured using a Likert scale ranging from 0 (not at all or never) to 4 (a great deal or all the time). To get a total score for each of the subscales, a summation was completed. As outlined by Simard and Savard (2009), each subscale has a specific set of questions. These questions measure the strength of the survivors' FOR for one specific area of concern. Listed below are the subscales used and their corresponding question numbers:

FCRI subscales:

- Triggers: Sum items 1 to 8
- Severity: Sum items 9 to 17 (reversed item 13 before)

- Psychological Distress: Sum items 18 to 21
- Functioning Impairments: Sum items 22 to 27
- Insight: Sum items 28 to 30
- Reassurance: Sum items 31 to 33
- Coping Strategies: Sum items 34 to 42
- Total FCRI score: Summing items 1 to 42 (reversed item 13 before)

To complete the summation correctly, question number 13 for the subscale *severity* must be reversed prior to calculation. This means that the rating 0-4 is reversed or flipped to ensure that the participants were answering honestly and not giving each question the same score out of routine. The higher the score per subscale, the greater the level of FOR for that area of concern or interest (see Table 3 for more in-depth findings). Table 3 details an overall minimum-maximum, mean, standard deviation, and skewness and kurtosis report for the populations. Thereafter, a detailed breakdown per cancer group is given (Table 4).

Table 3

Overall FCRI Descriptive Statistics, Skewness, & Kurtosis

FCRI factors	*N*	*Min.*	*Max.*	*M*	*SD*
Triggers	97	8	38	28.75	5.29
Severity	97	9	45	32.49	6.36
Psychological Distress	97	4	20	14.07	4.21
Functioning Impairments	97	6	30	17.21	6.47
Insight	97	3	15	7.30	3.46
Reassurance	97	3	15	10.75	2.98
Coping Strategies	96	22	49	39.09	5.80
Valid N (listwise)	96				

	Skewness		*Kurtosis*	
	Statistic	Std. Error	Statistic	Std. Error
Triggers	-0.75	0.25	1.39	0.49
Severity	-0.98	0.25	1.31	0.49
Psychological Distress	-0.48	0.25	-0.57	0.49
Functioning Impairments	-0.02	0.25	-0.97	0.49
Insight	0.22	0.25	-1.21	0.49
Reassurance	-0.72	0.25	-0.21	0.49
Coping Strategies	-0.45	0.25	-0.02	0.49

The overall averages for the study were:

- **Triggers**—28.75 (*SD* = 5.29) with a skewness of -0.75 (*SE* = 0.25) and kurtosis of 1.39 (*SE* = 0.49).
- **Severity**—32.49 (*SD* = 6.36) with a skewness of -0.98 (*SE* = 0.25) and kurtosis of 1.31 (*SE* = 0.49).
- **Psychological Distress**—14.07 (*SD* = 4.21) with a skewness of -0.48 (*SE* = 0.25) and kurtosis of -0.57 (*SE* = 0.49).

- **Functioning Impairments**—17.21 (*SD* = 6.47) with a skewness of -0.02 (*SE* = 0.25) and kurtosis of -0.97 (*SE* = 0.49).
- **Insight**—7.30 (*SD* = 3.46) with a skewness of 0.22 (*SE* = 0.25) and kurtosis of -1.21 (*SE* = 0.49).
- **Reassurance**—10.75 (*SD* = 2.98) with a skewness of -0.72 (*SE* = 0.25) and kurtosis of -0.21 (*SE* = 0.49).
- **Coping Strategies**—39.09 (*SD* = 5.80) with a skewness of -0.45 (*SE* = 0.25) and kurtosis of -0.02 (*SE* = 0.49).

Originally, the skewness for *coping strategies* was over 1, signifying an abnormal distribution. If the skewness of a variable is less than -1 or greater than 1, the data is highly skewed; values closest to 0 have greater symmetry or are normally distributed. In research with human participants, an exact value of 0 is not typical, instead the researcher hopes for values that are closest to 0 as possible. To remedy the issue of skewness for the variable coping strategies, a Lg10 was conducted in SPSS. This option was not worthwhile, the skewness became worse; a second alternative needed to be explored. Looking closer at the data, an outlier with a value of 10 was identified. This value alone was causing a disruption in the data, so it was discretely removed from the data set (under variable view, discrete missing values) and the skewness for coping strategies returned to a normal, acceptable value of -0.45 (SE = 0.25).

Table 4

FCRI Descriptives Per Cancer Site

FCRI factors	Number of items	Score range	Lung & Bronchus (N = 48)		Female Breast (N = 49)	
			M	*SD*	*M*	*SD*
Triggers	8	0-38	29.8	5.3	27.8	5.1
Severity	9	0-45	33.9	6.1	31.2	6.4
Psychological Distress	4	0-20	15.3	3.5	12.9	4.5
Functioning Impairments	9	0-30	19.9	5.6	14.6	6.2
Insight	6	0-15	8.2	3.2	6.5	3.5
Reassurance	3	0-15	11.7	2.6	9.9	3.1
Coping Strategies	3	0-49	39.0	5.5	39.1	6.1
Total Score	42	212				

Table 4 details the mean and standard deviations *per population*. The results for the lung and bronchus population was:

- **Triggers**—29.8 (*SD* = 5.3)
- **Severity**—33.9 (*SD* = 6.1)
- **Psychological Distress**—15.3 (*SD* = 3.5)
- **Functioning Impairments**—19.9 (*SD* = 5.6)
- **Insight**—8.2 (*SD* = 3.2)
- **Reassurance**—11.7 (*SD* = 2.6)
- **Coping Strategies**—39.0 (*SD* = 5.5)

Female breast cancer:

- **Triggers**—27.8 (*SD* = 5.1)
- **Severity**—31.2 (*SD* = 6.4)

- **Psychological Distress**—12.9 (*SD* = 4.5)
- **Functioning Impairments**—14.6 (*SD* = 6.2)
- **Insight**—6.5 (*SD* = 3.5)
- **Reassurance**—9.9 (*SD* = 3.1)
- **Coping Strategies**—39.1 (*SD* = 6.1)

It is surprising to see that lung and bronchus survivors did not fare worse (scoring wise) on the FCRI assessment in comparison to their counterparts, the female breast cancer survivors. Lung and bronchus cancers have a significantly higher rate of mortality, hence the reason it is considered the most lethal of cancers. This tended to, in the past, correlate to greater fears and worries. While recurrence is typically high for both groups, breast cancer treatment has improved significantly over the years, making it appear more treatable or 'curable' to those diagnosed (the survival rate is in the 90 percentiles 5+ years into remission). Nonetheless, Table 4 does not suggest that either group appraises his or her risks much differently, rate wise. FOR is a concern across the board for all subscales for either group.

Correlations

Table 5

FCRI Subscale Inter-Correlations & Reliability

FCRI factors	F1	F2	F3	F4	F5	F6	F7	Cronbach's alpha
F1-Triggers	1.00	0.56*	0.49*	0.55*	0.55*	0.40*	0.05	0.77
F2-Severity		1.00	0.68*	0.71*	0.58*	0.50*	0.16	0.84
F3-Psychological Distress			1.00	0.72*	0.55*	0.51*	0.18	0.82
F4-Functioning Impairments				1.00	0.76*	0.65*	0.19	0.93
F5-Insight					1.00	0.52*	0.15	0.81
F6-Reassurance						1.00	0.40*	0.75
F7-Coping Strategies							1.00	0.82
Total Score								0.84

*$p < 0.01$

Spearman's Correlations

A Spearman's correlation test was conducted to determine the strength and direction of the *monotonic* relationship between pairings of my study variables and the FCRI subscales. A monotonic relationship is when variables decrease or increase in the same direction but not necessarily at the same rate, which is unlike linear variables—where variables increase or decrease in the same direction and at the same rate (Schechtman & Yitzhaki, 2010). Tables 5 and 6 show the results of the Spearman's test. Table 5 specifically focuses on the interconnectedness of the FCRI subscales alone—subscales were paired to see if there were significant associations. We can see that *triggers*, *severity*, *psychological distress*, *functioning impairments*, *insight*, and *reassurance* are significantly correlated ($p < 0.01$) to each other in every instance. Because each of these values was greater than 0, the correlations were deemed positive in

nature. The closer the value is to +1, the stronger the positive association. A value of -1 indicates a perfect negative association in the ranking of variables, while 0 implies no association at all. *Coping strategies* was the only variable that appeared to have minimal significant correlations; it was only correlated to *reassurance*.

Table 6 depicts correlations between the FCRI variables and demographic characteristics. Outside of the original 7 FCRI subscales, the following areas were explored: *gender*, *age*, *ethnicity*, *race*, *highest level of education*, *years in remission*, and *type of cancer*. The significant Spearman's correlation coefficients reported were:

Triggers:

- Highest level of education ($r_s = -0.469$, $p < 0.01$)
- Years in remission ($r_s = -0.327$, $p < 0.01$)
- Type of cancer ($r_s = -0.213$, $p < 0.05$)

Severity:

- Highest level of education ($r_s = -0.317$, $p < 0.01$)
- Years in remission ($r_s = -0.445$, $p < 0.01$)
- Type of cancer ($r_s = -0.221$, $p < 0.05$)
- Cancer stage ($r_s = 0.224$, $p < 0.05$)

Psychological Distress:

- Gender ($r_s = -0.224$, $p < 0.05$)
- Highest level of education ($r_s = -0.253$, $p < 0.05$)
- Years in remission ($r_s = -0.441$, $p < 0.01$)
- Type of cancer ($r_s = -0.261$, $p < 0.01$)

Functioning Impairments:

- Gender (r_s = -0.305, $p < 0.01$)
- Highest level of education (r_s = -0.380, $p < 0.01$)
- Years in remission (r_s = -0.521, $p < 0.01$)
- Type of cancer (r_s = -0.401, $p < 0.01$)

Insight:

- Gender (r_s = -0.249, $p < 0.05$)
- Age (r_s = -0.256, $p < 0.05$)
- Highest level of education (r_s = -0.311, $p < 0.01$)
- Years in remission (r_s = -0.456, $p < 0.01$)
- Type of cancer (r_s = -0.260, $p < 0.01$)

Reassurance:

- Gender (r_s = -0.256, $p < 0.05$)
- Highest level of education (r_s = -0.276, $p < 0.01$)
- Years in remission (r_s = -0.270, $p < 0.01$)
- Type of cancer (r_s = -0.286, $p < 0.01$)
- Cancer stage (r_s = 0.237, $p < 0.05$)

Coping Strategies:

- Age (r_s = 0.228, $p < 0.05$)

Gender:

- Highest level of education (r_s = 0.234, $p < 0.05$)
- Years in remission (r_s = 0.326, $p < 0.01$)

- Type of cancer ($r_s = 0.726$, $p < 0.01$)

Ethnicity:

- Race ($r_s = -0.640$, $p < 0.01$)

Highest Level of Education:

- Type of cancer ($r_s = 0.287$, $p < 0.01$)
- Cancer stage ($r_s = -0.340$, $p < 0.01$)

Years in Remission:

- Type of cancer ($r_s = 0.388$, $p < 0.01$)

Reliability

Cronbach's alpha, a measure of internal consistency or reliability, was conducted on all the FCRI variables (refer to Table 5). In the social and medical sciences, a reliability coefficient value of 0.70 is considered acceptable but the 0.80-0.90 range is preferred (Tavakol & Dennick, 2011). A consistently high reliability score, over 0.90, suggests that there is redundancy in the test questions and there may be a need for revisions (Tavakol & Dennick, 2011).

The subscales with acceptable Cronbach's alpha scores ranging from 0.70-0.80, were *triggers* and *reassurance*. Triggers had 8 items and an $\alpha = 0.77$. Reassurance had 3 items and the alpha measured at 0.75. High reliability subscales, ranging from 0.80-0.90, included *severity* (9 items, $\alpha = 0.84$), *psychological distress* (4 items, $\alpha = 0.82$), *insight* (6 items, $\alpha = 0.81$), and *coping strategies* (3 items, $\alpha = 0.82$). Lastly, *functioning impairments*, had a reliability score of $\alpha = 0.93$ (9 items). While this score is only

slightly over the preferred value of 0.90, in the future, this area of the questionnaire may need to be revamped. The overall reliability for the FCRI questionnaire was $\alpha = 0.84$.

Table 6

Spearman's Correlations Between FCRI Subscales & Continuous Variables

FCRI factors		Gender	Age	Ethnicity	Race	Highest Level of Education	Years in Remission	Type of Cancer	Cancer Stage
F1-Triggers	Correlation Coefficient	-0.18	0.00	0.02	-0.09	-0.47	-0.33	-0.21	0.20
	Sig. (2-tailed)	0.08	0.99	0.82	0.40	0.00	0.00	0.04	0.06
	N	97.00	97.00	97.00	97.00	97.00	97.00	97.00	97.00
F2-Severity	Correlation Coefficient	-0.15	-0.07	-0.03	-0.04	-0.32	-0.45	-0.22	0.22
	Sig. (2-tailed)	0.15	0.52	0.78	0.68	0.00	0.00	0.03	0.03
	N	97.00	97.00	97.00	97.00	97.00	97.00	97.00	97.00
F3-Psychological Distress	Correlation Coefficient	-0.22	0.02	-0.08	-0.04	-0.25	-0.44	-0.26	0.16
	Sig. (2-tailed)	0.03	0.84	0.44	0.72	0.01	0.00	0.01	0.13
	N	97.00	97.00	97.00	97.00	97.00	97.00	97.00	97.00
F4-Functioning Impairments	Correlation Coefficient	-0.31	-0.12	0.02	-0.10	-0.38	-0.52	-0.40	0.19
	Sig. (2-tailed)	0.00	0.23	0.82	0.32	0.00	0.00	0.00	0.06
	N	97.00	97.00	97.00	97.00	97.00	97.00	97.00	97.00
F5-Insight	Correlation Coefficient	-0.25	-0.26	0.03	-0.05	-0.31	-0.46	-0.27	0.06
	Sig. (2-tailed)	0.01	0.01	0.76	0.63	0.00	0.00	0.01	0.57
	N	97.00	97.00	97.00	97.00	97.00	97.00	97.00	97.00
F6-Reassurance	Correlation Coefficient	-0.26	0.02	0.02	-0.10	-0.28	-0.27	-0.29	0.24
	Sig. (2-tailed)	0.01	0.89	0.85	0.33	0.01	0.01	0.01	0.02
	N	97.00	97.00	97.00	97.00	97.00	97.00	97.00	97.00
F7-Coping Strategies	Correlation Coefficient	0.15	0.23	-0.01	0.02	-0.06	-0.11	0.02	0.05
	Sig. (2-tailed)	0.16	0.03	0.90	0.84	0.58	0.30	0.85	0.61
	N	96.00	96.00	96.00	96.00	96.00	96.00	96.00	96.00

		Gender	Age	Ethnicity	Race	Highest Level of Education	Years in Remission	Type of Cancer	Cancer Stage
Gender	Correlation Coefficient	1.00	-0.05	0.01	-0.05	0.23	0.33	0.73	0.04
	Sig. (2-tailed)		0.65	0.93	0.60	0.02	0.00	0.00	0.70
	N		97.00	97.00	97.00	97.00	97.00	97.00	97.00
Age	Correlation Coefficient		1.00	-0.14	0.19	-0.02	0.09	-0.01	0.15
	Sig. (2-tailed)			0.18	0.07	0.83	0.37	0.96	0.14
	N			97.00	97.00	97.00	97.00	97.00	97.00
Ethnicity	Correlation Coefficient			1.00	-0.64	0.08	-0.01	0.03	-0.03
	Sig. (2-tailed)				0.00	0.43	0.96	0.77	0.74
	N				97.00	97.00	97.00	97.00	97.00
Race	Correlation Coefficient				1.00	-0.09	-0.07	-0.09	0.01
	Sig. (2-tailed)					0.37	0.52	0.40	0.92
	N					97.00	97.00	97.00	97.00
Highest level of Education	Correlation Coefficient					1.00	0.19	0.29	-0.34
	Sig. (2-tailed)						0.06	0.00	0.00
	N						97.00	97.00	97.00
Years in Remission	Correlation Coefficient						1.00	0.39	-0.06
	Sig. (2-tailed)							0.00	0.55
	N							97.00	97.00
Type of Cancer	Correlation Coefficient							1.00	0.01
	Sig. (2-tailed)								0.96
	N								97.00
Cancer Stage	Correlation Coefficient								1.00
	Sig. (2-tailed)								
	N								

Regression Outcomes

To answer the research question at hand, I conducted a multiple regression test. This type of test is appropriate when exploring the relationship between several independent (or predictor) variables and the dependent variable. The results of the regression help the researcher to understand which variables are the best predictors of the dependent variable. Below are the results of the multiple regression tests, as well as tests looking at homogeneity of variance. For clarity purposes, each population will be detailed separately.

Levene's Test for Equality of Variance and Kruskal-Wallis

The Levene's test is used in research to assess whether a study has equal variance across the sample or population (Brown & Forsythe, 1974). It is sometimes called *homogeneity of variance* and it is a precondition for t-tests and ANOVAs. The results of the Levene's test are reported with a *p*-value, which is compared to the alpha level for the test. If *p* is larger than the alpha, the variances are balanced or equal and the null hypothesis stands; if *p* is smaller than the alpha, the variances are unbalanced or unequal (Brown & Forsythe, 1974).

The Kruskal-Wallis test is a rank-based nonparametric test. It is used to assess "the differences among three or more independently sampled groups on a single, non normally distributed continuous variable" (McKnight & Najab, 2010, p. 1). The test was designed to be sensitive to unequal means. When looking at the values for the Kruskal-Wallis test, if there is significance, the distribution is unbalanced—there is a sample that

dominates over another. For this study, the Kruskal-Wallis was used on variables with significant Levene's test findings, to ensure that normality was or was not being upheld.

Table 7

Lung & Bronchus: Levene's Test of Equality of Error Variances

	df1	*df2*	*F*	*Sig.*
Triggers	11	35	1.37	0.23
Severity	11	35	3.22	0.004
Psychological Distress	11	35	1.07	0.41
Functioning Impairments	11	35	1.92	0.07
Insight	11	35	2.48	0.02
Reassurance	11	35	1.51	0.17
Coping Strategies	11	35	2.60	0.02

Table 8

Re-Run of Levene's Test: Race Outliers Removed

	df1	*df2*	*F*	*Sig.*
Severity	11	33	3.31	0.003
Insight	11	34	2.04	0.06
Coping Strategies	11	33	2.60	0.01

I conducted a Levene's test on the subscales for lung and bronchus cancer survivors. Of the variables tested, *triggers*, *psychological distress*, *functioning impairments*, and *reassurance* all displayed homogeneity of variance (the *p*-value is larger than 0.05). There were three variables where the *p*-value was smaller than the alpha, signifying that the variances were unequal: *severity*, *insight*, and *coping strategies* (Table 7). Because there was significance, I checked to see if there were outliers skewing the results, even those that were minor and had not affected the results thus far. In all

three subscales, race had outliers. Upon removing two outliers each from severity and coping strategies and one outlier from insight, insight became homogenous (Table 8). However, severity and coping strategies remained significant. As a follow-up, a Kruskal-Wallis test was conducted on the two remaining significant variables because the assumptions from the previous test were not met (Table 9). Based on the information gained from the Kruskal-Wallis test, neither *severity* or *coping strategies* had medians that were equal because the *p*-value was not ≤ 0.05.

- **Severity**: $\chi^2(5) = 3.42$, $p = 0.64$
- **Coping Strategies**: $\chi^2(5) = 2.24$, $p = 0.82$

Table 9

Lung & Bronchus Kruskal-Wallis Test

	Severity	*Coping Strategies*
Chi-Square	3.42	2.24
df	5.00	5.00
Asymp. Sig.	0.64	0.82

a Kruskal Wallis Test

b Grouping Variable: Race

For the female breast cancer group, the Levene's test was able to show homogeneity across all variables; none of the variables had a significance value of 0.05 or less (Table 10). No further testing was needed.

Table 10

Female Breast: Levene's Test of Equality of Error Variances

	df1	*df2*	*F*	*Sig.*
Triggers	7	41	0.94	0.49
Severity	7	41	1.63	0.16
Psychological Distress	7	41	1.48	0.20
Functioning Impairments	7	41	2.12	0.06
Insight	7	41	0.94	0.49
Reassurance	7	41	2.05	0.07
Coping Strategies	7	41	2.11	0.06

Lung & Bronchus Cancer Regression Results

Multiple regression analysis was used to test if *gender*, *age*, *ethnicity*, *highest level of education*, *years in remission*, and *cancer stage* predicted heightened FOR (measured using the 7 FCRI subscales). The results of the regression helped to reveal the following significant predicators:

- **Triggers** (Table 11): $F(6, 41) = 1.96$, $p = 0.095$, $R^2 = 0.223$

  Of the variables studied, *highest level of education* ($\beta = -1.11$, $p = 0.01$) was the only significant predictor for the subscale *triggers* in the lung and bronchus group, indicating that for every singular unit increase in triggers, there was a -1.11 unit increase in highest level of education.

- **Severity** (Table 12): $F(6, 41) = 1.72$, $p = 0.142$, $R^2 = 0.201$

  Highest level of education ($\beta = -1.02$, $p < 0.05$) was the only significant predictor for the FCRI subscale *severity*.

- **Psychological Distress** (Table 13): $F(6, 41) = 1.43$, $p = 0.229$, $R^2 = 0.173$

Years in remission (β= -1.71, $p < 0.05$) was a significant predictor for *psychological distress*; the was a -1.71-unit increase.

- **Functioning Impairments** (Table 14): $F(6, 41) = 2.70$, $p = 0.026$, $R^2 = 0.283$

  For *functioning impairments,* there was only one identifiable significant predictor variable, which was *years in remission* (β= -3.18, $p < 0.01$).

- **Insight** (Table 15): $F(6, 41) = 1.01$, $p = 0.430$, $R^2 = 0.129$

  There were no significant covariates for the FCRI subscale *insight*.

- **Reassurance** (Table 16): $F(6, 41) = 0.887$, $p = 0.513$, $R^2 = 0.115$

  As seen with the subscale insight, there were no significant predictors for *reassurance*.

- **Coping Strategies** (Table 17): $F(6, 40) = 1.990$, $p = 0.090$, $R^2 = 0.230$

  When studying *coping strategies*, the variables *gender* (β= 4.08, $p < 0.05$) and *age* (β= 1.56, $p = 0.01$) were significant predictors.

Table 11

Lung & Bronchus Regression of the FCRI Subscale Triggers

	B	*SE*	β	*t*	*P*
(Constant)	33.43	5.68		5.88	0.00
Gender	0.38	1.62	0.03	0.24	0.82
Age	0.14	0.59	0.03	0.23	0.82
Ethnicity	-0.40	1.72	-0.03	-0.23	0.82
Highest Level of Education	-1.11	0.41	-0.39	-2.68	0.01
Years in Remission	-1.30	1.02	-0.18	-1.28	0.21
Cancer Stage	0.63	0.84	0.11	0.74	0.46

Table 12

Lung & Bronchus Regression of the FCRI Subscale Severity

	B	*SE*	β	*t*	*P*
(Constant)	34.70	6.54		5.30	0.00
Gender	1.25	1.86	0.10	0.67	0.51
Age	0.36	0.67	0.08	0.54	0.59
Ethnicity	0.19	1.99	0.01	0.09	0.93
Highest Level of Education	-1.02	0.47	-0.32	-2.16	0.04
Years in Remission	-1.86	1.17	-0.23	-1.59	0.12
Cancer Stage	0.73	0.97	0.12	0.75	0.46

Table 13

Lung & Bronchus Regression of the FCRI Subscale Psychological Distress

	B	*SE*	β	*t*	*P*
(Constant)	19.36	3.84		5.05	0.00
Gender	-0.06	1.09	-0.01	-0.05	0.96
Age	0.00	0.40	0.00	0.01	1.00
Ethnicity	-0.12	1.16	-0.02	-0.10	0.92
Highest Level of Education	-0.35	0.28	-0.19	-1.26	0.22
Years in Remission	-1.71	0.69	-0.36	-2.49	0.02
Cancer Stage	0.15	0.57	0.04	0.27	0.79

Table 14

Lung & Bronchus Regression of the FCRI Subscale Functioning Impairments

	B	*SE*	β	*t*	*P*
(Constant)	23.45	5.70		4.11	0.00
Gender	0.28	1.62	0.02	0.17	0.86
Age	-0.25	0.59	-0.06	-0.43	0.67
Ethnicity	1.49	1.73	0.12	0.86	0.39
Highest Level of Education	-0.45	0.41	-0.15	-1.08	0.29
Years in Remission	-3.18	1.02	-0.42	-3.12	0.00
Cancer Stage	0.96	0.84	0.17	1.14	0.26

Table 15

Lung & Bronchus Regression of the FCRI Subscale Insight

	B	*SE*	β	*t*	*P*
(Constant)	12.46	3.63		3.44	0.00
Gender	-0.59	1.03	-0.09	-0.58	0.57
Age	-0.41	0.37	-0.16	-1.10	0.28
Ethnicity	0.47	1.10	0.06	0.42	0.68
Highest Level of Education	-0.19	0.26	-0.11	-0.72	0.48
Years in Remission	-1.07	0.65	-0.25	-1.65	0.11
Cancer Stage	0.23	0.54	0.07	0.42	0.67

Table 16

Lung & Bronchus Regression of the FCRI Subscale Reassurance

	B	*SE*	β	*t*	*P*
(Constant)	12.74	2.91		4.38	0.00
Gender	-0.23	0.83	-0.04	-0.27	0.79
Age	0.07	0.30	0.04	0.23	0.82
Ethnicity	0.10	0.88	0.02	0.11	0.91
Highest Level of Education	-0.41	0.21	-0.30	-1.96	0.06
Years in Remission	-0.24	0.52	-0.07	-0.47	0.64
Cancer Stage	0.13	0.43	0.05	0.31	0.76

Table 17

Lung & Bronchus Regression of the FCRI Subscale Coping Strategies

	B	*SE*	β	*t*	*P*
(Constant)	27.87	5.85		4.76	0.00
Gender	4.08	1.68	0.35	2.44	0.02
Age	1.56	0.60	0.37	2.58	0.01
Ethnicity	0.55	1.78	0.04	0.31	0.76
Highest Level of Education	-0.47	0.45	-0.15	-1.04	0.31
Years in Remission	-0.27	1.06	-0.04	-0.26	0.80
Cancer Stage	-0.96	0.87	-0.17	-1.11	0.27

Female Breast Cancer Regression Results

As with the previous population, a multiple regression analysis was performed to test if *age*, *ethnicity*, *highest level of education*, *years in remission*, and *cancer stage* predicted heightened FOR. The variable *gender* was removed from the analysis for this population because all participants were female. The results of the regression helped to reveal the following significant predicators:

- **Triggers** (Table 18): $F(5, 43) = 3.090$, $p = 0.018$, $R^2 = 0.264$

  Highest level of education was the only significant predictor for the FCRI subscale *triggers* ($\beta = -1.14$, $p < 0.01$), indicating that for every singular unit increase in highest level of education, there was a -1.14 unit increase in triggers.

- **Severity** (Table 19): $F(5, 43) = 4.253$, $p < 0.01$, $R^2 = 0.331$

  The variables *age* ($\beta = -1.28$, $p = 0.05$) and *years in remission* ($\beta = -2.08$, $p = 0.01$) were the only significant predictors for the FCRI subscale *severity*. Both variables had a negative unit increase.

- **Psychological Distress** (Table 20): $F(5, 43) = 2.478$, $p = 0.047$, $R^2 = 0.224$

Years in remission (β= -1.62, $p = 0.01$) was a significant covariate of the subscale *psychological distress*.

- **Functioning Impairments** (Table 21): $F(5, 43) = 4.918$, $p < 0.001$, $R^2 = 0.364$

  Highest level of education (β= -0.82, $p = 0.05$) and *years in remission* (β= -2.05, $p = 0.01$) were both found to have a significant relationship with *functioning impairments*.

- **Insight** (Table 22): $F(5, 43) = 6.288$, $p < 0.001$, $R^2 = 0.422$

  Age (β= -0.81, $p < 0.05$), *highest level of education* (β= -0.51, $p < 0.05$), and *years in remission* (β= -1.26, $p < 0.01$) were all predictive of the subscale *insight*.

- **Reassurance** (Table 23): $F(5, 43) = 2.023$, $p = 0.094$, $R^2 = 0.190$

  For the FCRI subscale *reassurance*, there were no significant covariates identified.

- **Coping Strategies** (Table 24): $F(5, 43) = 1.195$, $p = 0.328$, $R^2 = 0.122$

  There was only one identifiable, significant predictor for *coping strategies*, which was *years in remission* (β= -1.70, $p < 0.05$).

Table 18

Female Breast Regression of the FCRI Subscale Triggers

	B	*SE*	β	*t*	*P*
(Constant)	32.21	4.98		6.47	0.00
Age	0.22	0.53	0.06	0.41	0.68
Ethnicity	1.19	1.64	0.10	0.73	0.47
Highest Level of Education	-1.14	0.36	-0.47	-3.16	0.00
Years in Remission	-0.92	0.62	-0.20	-1.48	0.15
Cancer Stage	-0.32	0.78	-0.06	-0.40	0.69

Table 19

Female Breast Regression of the FCRI Subscale Severity

	B	*SE*	β	*t*	*P*
(Constant)	44.85	5.99		7.49	0.00
Age	-1.28	0.64	-0.26	-1.99	0.05
Ethnicity	-2.28	1.97	-0.15	-1.16	0.25
Highest Level of Education	-0.15	0.43	-0.05	-0.34	0.74
Years in Remission	-2.08	0.75	-0.36	-2.78	0.01
Cancer Stage	1.70	0.94	0.26	1.80	0.08

Table 20

Female Breast Regression of the FCRI Subscale Psychological Distress

	B	*SE*	β	*t*	*P*
(Constant)	18.53	4.57		4.06	0.00
Age	-0.12	0.49	-0.03	-0.24	0.81
Ethnicity	-1.26	1.50	-0.12	-0.84	0.41
Highest Level of Education	-0.01	0.33	-0.01	-0.04	0.97
Years in Remission	-1.62	0.57	-0.39	-2.85	0.01
Cancer Stage	0.80	0.72	0.17	1.11	0.28

Table 21

Female Breast Regression of the FCRI Subscale Functioning Impairments

	B	*SE*	β	*t*	*P*
(Constant)	27.38	5.65		4.85	0.00
Age	-0.91	0.61	-0.19	-1.51	0.14
Ethnicity	-0.45	1.86	-0.03	-0.24	0.81
Highest Level of Education	-0.82	0.41	-0.28	-2.02	0.05
Years in Remission	-2.05	0.70	-0.36	-2.91	0.01
Cancer Stage	0.88	0.89	0.14	0.99	0.33

Table 22

Female Breast Regression of the FCRI Subscale Insight

	B	*SE*	β	*t*	*P*
(Constant)	17.64	3.03		5.81	0.00
Age	-0.81	0.33	-0.30	-2.49	0.02
Ethnicity	-0.29	1.00	-0.04	-0.30	0.77
Highest Level of Education	-0.51	0.22	-0.31	-2.34	0.02
Years in Remission	-1.26	0.38	-0.40	-3.32	0.00
Cancer Stage	-0.33	0.48	-0.09	-0.69	0.50

Table 23

Female Breast Regression of the FCRI Subscale Reassurance

	B	*SE*	β	*t*	*P*
(Constant)	11.88	3.20		3.72	0.00
Age	-0.32	0.34	-0.13	-0.92	0.36
Ethnicity	-0.33	1.05	-0.05	-0.32	0.75
Highest Level of Education	-0.16	0.23	-0.11	-0.71	0.48
Years in Remission	-0.41	0.40	-0.15	-1.04	0.31
Cancer Stage	0.99	0.50	0.31	1.97	0.06

Table 24

Female Breast Regression of the FCRI Subscale Coping Strategies

	B	*SE*	β	*t*	*P*
(Constant)	38.72	6.53		5.93	0.00
Age	0.59	0.70	0.13	0.84	0.41
Ethnicity	-0.26	2.15	-0.02	-0.12	0.90
Highest Level of Education	0.12	0.47	0.04	0.25	0.81
Years in Remission	-1.70	0.82	-0.31	-2.08	0.04
Cancer Stage	0.81	1.03	0.13	0.79	0.44

Cancer Type Regression Results

For the final multiple regression analysis was conducted to see if cancer type predicted FOR (using the FCRI subscales). This regression analysis was conducted to address $H_1$1a. The results of the regression helped to reveal the following significant predicators:

Table 25

Cancer Type Regression of FCRI Subscales

		B	*SE*	β	*t*	*P*
Triggers	(Constant)	31.72	1.68		18.87	0.00
	Type of cancer	-1.97	1.06	-0.19	-1.86	0.07
Severity	(Constant)	37.14	1.85		20.08	0.00
	Type of cancer	-2.99	1.16	-0.26	-2.58	0.01
Psychological Distress	(Constant)	17.58	1.31		13.44	0.00
	Type of cancer	-2.33	0.83	-0.28	-2.83	0.01
Functioning Impairments	(Constant)	25.28	1.90		13.29	0.00
	Type of cancer	-5.37	1.20	-0.42	-4.47	0.00
Insight	(Constant)	9.88	1.08		9.12	0.00
	Type of cancer	-1.72	0.68	-0.25	-2.51	0.01
Reassurance	(Constant)	13.41	0.92		14.59	0.00
	Type of cancer	-1.77	0.58	-0.30	-3.05	0.00
Coping Strategies	(Constant)	38.84	1.73		22.49	0.00
	Type of cancer	0.48	1.09	0.05	0.44	0.66

- **Triggers**: $F(1, 95) = 3.471$, $R^2 = 0.035$, $\beta = -0.19$, $p = 0.07$
- **Severity**: $F(1, 93) = 6.654$, $R^2 = 0.067$, $\beta = -0.26$, $p < 0.01$

- **Psychological Distress**: $F(1, 95) = 7.993$, $R^2 = 0.078$, $\beta = -0.28$, $p < 0.01$
- **Functioning Impairments**: $F(1, 95) = 20.001$ $R^2 = 0.174$, $\beta = -0.42$, $p < 0.01$
- **Insight**: $F(1, 95) = 6.312$, $R^2 = 0.062$, $\beta = -0.25$, $p < 0.01$
- **Reassurance**: $F(1, 95) = 9.303$, $R^2 = 0.089$, $\beta = -0.30$, $p < 0.01$
- **Coping Strategies**: $F(1, 91) = 0.196$, $R^2 = 0.002$, $\beta = -0.05$, $p = 0.66$

Of the FCRI subscales studied, cancer was a predictor for every subscale except triggers and coping strategies ($p < 0.01$). For every unit increase in cancer type, the FCRI subscales severity ($\beta = -0.26$), psychological distress ($\beta = -0.28$), functioning impairments ($\beta = -0.42$), insight ($\beta = -0.25$), and reassurance ($\beta = -0.30$), experienced a decrease in the beta coefficient value, implying an inverse relationship. It appears that individuals with lung and bronchus cancer tended to fair worse in response to FOR, in comparison to their counterparts, female breast cancer survivors. These results were somewhat expected, bearing in mind that lung and bronchus cancers tend to be more aggressive, have higher recurrence rates, and lower long-term survival rates (Kim et al., 2012).

The variable triggers asked the survivors about specific situations in which they would think about the possibility of their cancer recurring. Because there was no significance, it is possible that in these survivors, what triggered them the most was not mentioned. For instance, the questions concerning conversations about the illness, seeing or hearing about someone else's ill, television shows, and funerals did not seem to register high on the scale. However, going to get a physical examination and not feeling physically well did. Coping strategies' questions looked at how survivors coped with FOR and if they thought the strategies were useful or helpful. It possible that the

survivors, based on this information, did not use the coping strategies mentioned to deal with FOR and or felt that the strategies were not helpful.

Summary

Data screening, pretest analyses, and sample demographics were presented in this chapter. The samples consisted primarily of Non-Hispanic American, European American men and women whose ages ranged from 25 years and onward. All participants were survivors of lung and bronchus or female breast cancer at the time of participation and were actively in the survivorship (remission) stage. In the results for research question #1, the null hypothesis was rejected; there are clear cut connections between the type of cancer a person has and the severity of their condition and fear of recurrence development. However, cancer stage (a measurement of the independent variable severity), was not a predictive of fear of recurrence. This study is analyzed and summarized further in Chapter 5, which includes a discussion of conclusions, implications, potential for social change, and recommendations for further research in the field of health psychology and psycho-oncology.

Chapter 5: Interpretations, Conclusions, and Recommendations

Introduction

The purpose of this quantitative study was to explore the relationship between FOR and cancer severity and type within the lung and bronchus and female breast cancer survivor populations. I administered the FCRI survey and scored the results. The results of this study helped to expand on information surrounding FOR in the following three ways: (a) examination of how uncontrollable cancer-related risk factors influenced FOR development, (b) inclusion of survivors with high recurrence and mortality rate cancers, and (c) inclusion of young cancer survivors. Understanding the connections between cancer type and severity may help practitioners to tailor prevention and intervention programs for survivors worried about cancer recurrence. Additional benefits include increasing awareness about the biological and psychological threats associated with FOR, such as immunosuppression and mental health comorbidity, and encouraging psycho-oncologists and oncologists to become hyperaware of atypical symptoms and behaviors. Hopefully, with an increase in awareness, more cancer survivors and patients will be tested and treated earlier on, thus helping to decrease FOR rates and increase their overall QoL and ability to cope appropriately.

Interpretation of the Findings

Hypotheses Acceptance or Rejection

The original research question sought to explain whether there was a relationship between the type of cancer a survivor had and the severity of said cancer's impact on FOR development. Additionally, I measured the severity (a measurement of strength;

low, moderate, and high or clinical levels) of FOR in each of the populations, although this was not the primary goal of the study. The hypotheses established were

$H_0$1a: There is no significant relationship between cancer type as it relates to the development of FOR in lung and bronchus and female breast cancer survivors.

$H_1$1a: The variable cancer type is significantly correlated to FOR development in both cancer survivor groups: lung and bronchus and female breast.

$H_0$1b: There is no significant relationship between cancer severity as it relates to the development of FOR in lung and bronchus and female breast cancer survivors.

$H_1$1b: The variable cancer severity is predictive of FOR development in both the lung and bronchus and female breast cancer survivor groups.

Here is a recap of what the subscales were measuring individually, as delineated by Simard and Savard (2009):

> The first factor, **triggers**, comprises eight items of which seven assess specific situations that make one think about the possibility of a cancer recurrence and one item that assesses to how far these situations are generally avoided. The second factor, **severity**, includes nine items that assess the presence, the frequency, the intensity, and the duration of the thoughts associated with FCR, the perceived risk of recurrence, the legitimacy of worrying about cancer recurrence, and the presence of other unpleasant thoughts or images that come to mind in association with FCR. Moreover, it comprises one reverse item assessing the belief that one is cured. This item makes it possible to control for automatic patterns of response. The third factor, **psychological distress**, includes four types of emotions frequently triggered by thoughts about cancer recurrence. The fourth factor,

> **coping strategies**, comprises nine strategies that may be used to cope with FCR. The fifth factor, **functioning impairments**, includes six domains of functioning that can be disturbed by FCR. The sixth factor, **insight**, contains three items assessing the extent to which the patients perceive their fear as excessive or unreasonable. The seventh factor, **reassurance**, comprises three reassurance behaviors specific to FCR. (p. 246)

$H_1$1a acceptance: Cancer type. The first alternative hypothesis concerning cancer type and FOR held up in this study; therefore, I rejected the null hypothesis. There were clear and noticeable FOR concerns identified by the survivors. Of the seven subscales studied, five (severity, psychological distress, functioning impairments, insight, and reassurance) were producers of FOR for lung and bronchus and female breast cancer survivors; additionally, all significant subscales produced clinical levels of distress. In neither of the populations did triggers or coping strategies measure significant. Currently, only a few studies have examined the possibility of cancer type impacting FOR development (Butow et al., 2015; Humphris & Ozakinci, 2008; Ness et al., 2013). This area of FOR research is currently lacking. Moreover, while researchers indicated that FOR is a significant concern in nearly all cancer survivors, none explored the relationship with cancer type in depth.

$H_1$1b acceptance: Cancer severity. The independent variable, severity, was used as a measurement of age, years (or time) in remission, and cancer stage. In order to assess severity's influence on FOR development, I chose to detail the sub-variables' connections to each of the FCRI subscales separately. This helped to show how monumental the individual characteristics of severity were.

Age. The study's findings confirmed that in both lung and bronchus and female breast cancer survivors, age was a significant predictor of FOR. When looking at the coping strategies of lung and bronchus cancer survivors, age played a role. In the current literature, there was little mention of age being a factor in coping strategies for lung and bronchus cancer patients. Instead, more focus was placed on the types of coping strategies used and in which instances, one technique was preferred or used more often than another. Additionally, there was mention about the appraisal process and how thoughts impacted coping strategies (Mishel, 1988). Simard and Savard (2009) revealed that younger individuals had higher FCRI totals but did not go into further detail about how age influenced coping.

For female breast cancer survivors, age was predictive of the subscales' severity and insight. In Koch's et al. (2014) study, long-term breast cancer survivors of a younger age tended to have higher rates of FOR, which was later associated with higher depression and lower QoL scores. Farajzadegan et al. (2014) noticed that older female breast cancer survivors tended to have better insight about their condition and were able to control and assess worries and fears with problem-focused coping. Problem-focused coping is for people who feel they are in control and can handle being in control; these people are also often optimistic about the future (Coon & Mitterer, 2014; Myers, 2011). The connection between age and severity was a more difficult theme to identify in current literature. Avis, Crawford, and Manuel (2003) found that the younger a woman was, the more frequent her concerns were. Women younger than 50 years of age tended to face many issues surrounding fertility, sexual dysfunction, body image, and premature

menopause (Avis et al., 2003). These issues increased the frequency and or duration of worries about cancer and recurrence.

Years in remission. Years in remission had a greater impact on FOR in comparison to a survivor's age, especially for the female breast cancer population. The amount of time spent in remission was significant when examining psychological distress and functioning impairments for lung and bronchus cancer survivors. There was little evidence in this area from previous researches. An extensive literature review was conducted on remission and survivorship but because of the lethalness of lung and bronchus cancer, survivorship is often short lived. In some cases, there are too few long-term survivors to study, so researcher may opt not to include them. However, for the research that is available, survivability, psychological distress, and functioning impairment have been consistent concerns.

Survivors are told early on that their type of cancer is known for being a "roaming cancer" or that it easily metastasizes. Survivors become uncertain. As Mishel (1999) reported, uncertainty can be damaging, no matter the prognosis of the illness. DeSantis et al. (2014) revealed that lung cancer survivors typically have a longer recovery period. Often, physical symptoms remain well beyond successful treatment. This increases the survivor's pain awareness that causes spikes in FOR throughout remission or the survivorship stage (DeSantis et al., 2014). In terms of depression (a common indicator of FOR), lung cancer survivors surpassed the subclinical threshold (Linden et al., 2012).

In the female breast cancer population, 5 out of the 7 subscales had significant relationships ($p \leq 0.05$) with years in remission, they included the following: severity, psychological distress, functioning impairments, insight, and coping strategies. These

results were partially corroborated in studies conducted by Deimling et al. (2006) and Mehnert et al., (2013). They reported that those in survivorship for extended periods had adverse responses with increased age, bodily pain or ailments, social interactions, and slower rehabilitation. In order to address concerns, religious and spirituality-based prayer was utilized more frequently, along with benefit finding (making meaning out of one's experiences), information seeking (insight), refusing to quit or give up, and self-distraction (Gonzalez et al., 2016; Levine et al., 2009). Adverse responses included fatalism and denial. Gonzales et al. (2016) made sure to note that cultural ethnic minorities are at a greater need for tangible resources that aid in emotional and psychological support. When utilized habitually, "…social support works as a buffer against poorer psychological adjustment to stressful events" (Liu et al., 2011, p. 170).

Functioning impairments were a significant predictor of FOR progression for all survivors regardless of time in remission, in Mehnert's et al. (2009) research. They discovered that women who had undergone chemotherapy and had physical impairments or pain post-treatment tended to report greater FoP (fear of progression; a synonym of FOR). It is believed, by some, that with physical impairments, there may be a loss of job which in turn reduces income and financial stability and creates uncertainty about family welfare (Mehnert et al., 2009). In younger women with high risk, aggressive breast cancer, this concern is exponentially increased because the threat of death is more prominent; younger women tend to receive more aggressive treatment for tumors and therefore have a "high risk of dying compared to their middle-aged counterparts even if diagnosed early and receiving an intense treatment" (Fredholm, Eaker, Frisell, Holmberg, Fredriksson, & Lindman, 2009, p. 1).

Cancer Stage. It has been speculated that cancer stage plays a major role in how patients and survivors assess their chances of overcoming and beating cancer. For many, the lesser the cancer, the greater the chance of survival. While this is not entirely true, research does confirm that survival is heavily based on the doctor's ability to treat and eradicate the cancer; when the stage of cancer is greater (III and IV), eradication is difficult and recurrence rates increase. With both cancers, treatability, at any stage, can be difficult. So, does this mean that cancer stage is irrelevant? It appears so. None of the subscales had a significant association with cancer stage for either group. While I was stunned by the results, there was some evidence, prior to this study, supporting the notion that with 'aggressive cancers', no matter the stage, death and recurrence were perceived as threats. FOR acts as a catalyst for preexisting fears and makes the survivors weary of or hypersensitive to pains, even those that are phantom (Anderson et al., 2005). As denoted by Baker et al. (2005), Kim et al. (2012), and Linden et al. (2012), the stage of cancer for lung and bronchus cancer survivors produced little to no variation in the strength of FOR experienced. This is corroborated when looking at the standard deviations for the FCRI subscale ratings, all 7 categories had high (clinical) levels of FOR.

Originally, I expected there to be some variation in FOR reporting based on the stage of cancer for those with female breast cancer. I knew that late recurrences (5+ years post-treatment) were common for invasive, late stage breast cancers, however, with the many advancements made in detectability and treatability, surely the rate of FOR would fluctuate. As seen with lung and bronchus cancer, there were no significant correlations. Mehnert et al. (2013) and Koch et al. (2014) confirmed the study's findings

that all stages frequently had moderate to high levels of FOR. They stated that long-term survivors and those with higher grade breast cancers (stage) feared recurrence more frequently. Koch et al. (2014) was able to prove that a significant number of all breast cancer survivors, regardless of stage, consistently had moderate to high levels of FOR.

The Degree of FOR. The original cutoffs for low, moderate, and high levels of FOR were not reported by the FCRI survey creators, Simard and Savard (2009), so I used a conservative method of reporting. With a conservative method, when reporting the standard deviations of a scale or variable, anything below -1 is low, +1 moderate, and +1 or greater, high or clinical level (DeSimone, Harms, & DeSimone, 2015). The overall standard deviations for all 7 subscales were above +1, implying a high or clinical level of fear surrounding cancer recurrence. Many of the scales had scores ranging from 5-6: *functioning impairments* (*SD* = 6.47), *severity* (*SD* = 6.36), *coping strategies* (*SD* = 5.80), and *triggers* (*SD* = 5.29). The remaining scales had scores ranging from 2-4: *psychological distress* (*SD* = 4.21), *insight* (*SD* = 3.46), and *reassurance* (*SD* = 2.98). The same is true of the populations when separated, all subscales scores were greater than +1.

When Simard and Savard (2009) initially conducted their study, lung cancer patients had the highest scores of any group but especially in functioning impairment. Breast cancer patients were among the those with greater rates of FOR (frequency and level wise). When examining lung cancer further, by differentiating the genders, there were no differences in rates. They concluded that the type of cancer an individual has is more influential on FOR severity than gender (Simard & Savard, 2009).

Limitations of the Study

There are three discernable limitations to this study, the first being the research design. While a quantitative approach was crucial for quantifying the variability of the factors—the 7 FCRI subscales, a qualitative design would have helped with the depth and breadth of the study. It was very clear early on, for instance, that some factors no longer predicted or were significantly associated with each other; the coping strategies of survivor was one of those factors that had shifted significantly. In prior studies, factors such as ethnicity (Reynolds, Hurley, Torres, Jackson, Boyd, & Chen, 2000), years in remission (Halstead & Fernsler, 1994), and functioning impairments were all influential in determining coping strategies. In this study, the trend did not uphold, but why? Because a quantitative design was used, I can only speculate. Had I used a mixed method or qualitative design, I would have been able to question and put more emphasis on why there was such a dynamic shift. This tends to be true in other areas of the study as well. However, the quantitative survey method did provide noteworthy, significant discoveries that may be used to guide future research endeavors.

Generalization across other cancer populations was the second noticeable limitation, in terms of threats to external validity. The demographic was purposely restricted for this study and for valid reasons—participants had to either have lung and bronchus cancer or female breast. It was explained early on that these two cancers were chosen as the focal groups because they have been and currently are considered the most lethal of cancers, thus affording the most opportunity for new FOR discoveries. When thinking about the implications for other cancers, the results of this study were not transferrable and here is why. From cancer to cancer, the prognosis, severity, mortality

rate, recurrence rate, etc. are weighted (or viewed) differently. Each cancer has its own set of features and depending on the features of the cancer, the survivor will respond accordingly. It is safe to say that a survivor from one group would not be able to fairly relate or understand to the woes of another cancer group. While there may be similarities, the differences are what create significant variations in behavior, thinking, and responsiveness to treatment and survivorship. An example would be being diagnosed with stage 5 cancer. The chances of survival after one year with stage 5 lung and bronchus cancer is extremely low, whereas women with stage 5 breast cancer tend to live for several years, sometimes decades depending on the age at diagnosis. Because of this, the appraisal process is completely different and thus FOR sensitivity may vary greatly. We can assume that the same would be true of other cancers not explored in this study. Outside of this concern, precautions were taken beforehand to make sure that the sample was representative of the two larger populations.

Lastly, it would have been beneficial to use a third cancer group to help with variability, as it relates to cancer severity. Both lung and bronchus and female breast cancer are severe or aggressive cancers; these cancers tend to have higher incidence, recurrence, and mortality rates. It is possible that by using these two groups alone, the information found was bound to report moderate to high scores. Having a third, less aggressive cancer might have helped to produce more variability in the data and between populations. Due to the nature of the study and time and resource restraints, the population focus had to be condensed, not allowing for a third population.

Recommendations

Based on the findings of this study, there is great potential for future research. Modifications to the survey itself are not necessarily needed but seeking individuals from more diverse or inclusive age and racial and ethnic groups could prove to be beneficial. Most of the participants from the current study were European American. If a future researcher were to specialize the racial or ethnic groups being studied, findings may shed light on previously underexplored areas of concern or interest. This is turn helps to illuminate best practices for addressing FOR throughout the survivorship stage per populace.

Future researchers may also consider adapting a qualitative approach. Through in-depth, exhaustive interviewing, researchers get to ask the questions of why, how, and what—identifying, detailing, and describing the participant's experiences with thoughts and emotions, as opposed to a measurement based on numeric information or quantities. The subscale *coping strategies* had surprising results and should be explored further. Particularly why were there not other predictive variables associated with coping strategies outside of age? Ethnicity and race, in previous studies, were significant predictors of coping style and maladaptive versus adaptive coping (Culver, Arena, Wimberly, Antoni, & Carver, 2007), so what has changed? Are all survivors fairing worse or have other groups learned to cope better over time and more mental health services become available? A qualitative approach would be best for detailing this type of information.

Implications for Positive & Progressive Social Change

By understanding the ways cancer type and severity influence the development of FOR, practitioners in the field can work towards developing and implementing intervention and treatment programs that promote quality survivorship. Previous research has suggested that when a cancer survivor appraises his or her condition in a positive manner, there is opportunity, which is beneficial because then the outlook becomes hopeful and the experience treasured (Mishel, 1999). In both survivor groups, positive appraisal is needed. Many of the factors associated with developing lung and bronchus or female breast cancer cannot be helped. Survivors may feel helpless to their condition. As we know, feelings of helplessness typically do not produce positive coping techniques and behaviors but instead increase anxiety and fears (Koch et al., 2014; Mehnert et al., 2013; Mishel, 1988). Studying this phenomenon further with other cancer groups could also prove to be beneficial, immediately and over time.

The more immediate benefits of this study's findings for diagnosing and treating practitioners include: a) more awareness about FOR and its symptoms, b) being able to consult with oncologists about the negative impact the condition is having on psychological and physical recovery, c) helping to promote better coping strategies to reduce triggers by looking at high risk FOR areas, d) improved client and family relations through communication and support, and e) being able to distinguish if the survivor needs medication and or therapy based on his or her level of FOR.

Conclusions

In closing, cancer type and cancer severity were significantly correlated to FOR. I was able to identify a gap in the literature on uncontrollable cancer related risk-factors

associated with FOR development. I explored the current gap by recruiting participants from the two most lethal cancers to-date and asked them to rate their FOR worries and concerns. The results showed that in both populations, cancer type unfavorably produced clinical levels of FOR, which based on previous literature, can decrease a person's QoL and increase mental health comorbidity. I was also able to prove that cancer severity adversely created worries amongst survivors which prompted FOR development. Further research into more diverse or specified populations, such as those of minorities and other underrepresented people, should be encouraged. This study's finding may help practitioners to develop and or tweak detection and intervention programs, thus potentially displacing the FOR rates of cancer survivors and patients, improving mental health, and increasing awareness about fears surrounding FOR.

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Appendix A: Demographic Questionnaire

Demographic Questionnaire

Background Information

This study is taking on the challenge of producing new information on fear of cancer recurrence (referred to as FOR or FCR) in two cancer populations with high recurrence rates; lung and bronchus and female breast cancer survivors. My hope is to better understand the survivors' outlook on FOR and essentially bring awareness to the fields of psychology and oncology about the phenomenon. Moreover, this research will help professionals working with cancer patients and survivors to better understand the challenges that come with survivorship. So, to you I say thank you for lending both your time and efforts to help better the lives of others and yourself.

Directions: Please select the appropriate responses to the following questions:

1. **Please select your gender.**
   - o Male
   - o Female

2. **What is your age range?**
   - o 17 years or younger
   - o 18 to 24 years
   - o 25 to 29 years
   - o 30 to 39 years
   - o 40 to 49 years
   - o 50 to 59 years
   - o 60 years or older

3. **Please select one or more of following options that fits your ethnic/racial background the best.**

   Ethnicity— Are you of Hispanic American, Latino, or of Spanish descent?
   - o Yes
   - o No

   Race—
   - o American Indian/Alaska Native
   - o African American or Black
   - o Caucasian or White
   - o Asian
   - o Native Hawaiian or Other Pacific Islander
   - o Two or more races: _____
   - o Other

4. **What is the highest level of education you have completed?**
   - o High school diploma
   - o GED

- Certificate
- Associates
- Bachelors
- Masters
- Doctorate
- Highest year completed: _____
- Other: _____

5. **How many years have you been in remission?**
   - Less than 1 year
   - 1-2 years
   - 3-5 years
   - 5+ years

6. **What is the type of cancer you have?**
   - Lung and or bronchus
   - Female breast

7. **Cancer stage.**
   - I
   - II
   - III
   - IV

Appendix B: Support Resources for Consideration

Lung Cancer Support Resources

Organization	Contact	Website
American Cancer Society--Cancer Survivors Network	800-227-2345	https://csn.cancer.org/
American Lung Association--Lung HelpLine	800-LUNGUSA	http://www.lung.org/support-and-community/lung-helpline-and-tobacco-quitline/
Lung Cancer Alliance—National Lung Cancer Support Group Network	888-220-2214	http://lungcanceralliance.org/get-help-and-support/coping-with-lung-cancer/support-groups/
Lungevity (online forum)		http://forums.lungevity.org/
CancerCare	800-813-4673	http://www.cancercare.org/support_groups
Cancer Support Community	888-793-9355	http://www.cancersupportcommunity.org/
Livestrong	855-220-7777	https://www.livestrong.org/we-can-help/finishing-treatment/emotions-after-cancer-treatment
Daily Strength (online forum)		https://www.dailystrength.org/groups?all=true
Lung Cancer Alliance—Phone Buddy Program	800-298-2436	http://www.lungcanceralliance.org/get-help-and-support/lca-services/phone-buddy/

Breast Cancer Support Resources

Organization	Contact	Website
Cancer Support Community	888-793-9355	http://www.cancersupportcommunity.org/
Susan G. Komen	877-465-6636	http://ww5.komen.org/BreastCancer/Support.html
ABCD After Breast Cancer Diagnosis	800-977-4121	http://www.abcdbreastcancersupport.org/
SHARE	844-ASK-SHARE	https://www.sharecancersupport.org/
Livestrong	855-220-7777	https://www.livestrong.org/we-can-help/finishing-treatment/emotions-after-cancer-treatment
Daily Strength (online forum)		https://www.dailystrength.org/groups?all=true
American Cancer Society—Cancer Survivors Network	800-227-2345	https://csn.cancer.org/
Young Survival Coalition (YSC)	877-972-1011	https://www.youngsurvival.org/connect/find-support-online
Sister Network (specifically for African American women)	866-781-1808	http://www.sistersnetworkinc.org/
Triple Negative Breast Cancer Foundation	877-880-8622	https://tnbcfoundation.org/helpline/