BREAST CANCER RISK FACTORS IN A SEXUAL MINORITY POPULATION:

AN EXAMINATION OF THE 2014 AND 2015 BEHAVIORAL RISK FACTOR

SURVEILLANCE SYSTEM

by

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ABSTRACT

This study is a secondary data analysis of the 2014 and 2015 Behavioral Risk Factor Surveillance System (BRFSS). Using a sample of 3,082 respondents, in three racial categories- White, African American, and Hispanic, this study examined sexual orientation and breast cancer risk factors. The sample size included 1,544 randomly selected heterosexual and 1,534 self-identified lesbians. The overall aim of this study is to explore behavioral and non-behavioral/demographic breast cancer risk factor differences between heterosexual women and lesbians.

Chi-square analysis revealed significant demographic differences between heterosexual women and lesbians in age, educational attainment, employment status, household income, and having health insurance. Race was not found to be significant. Analysis of behavioral factors also indicated higher rates of alcohol consumption and tobacco use, lower mammogram use, and lower fruit intake in the lesbian population compared to heterosexual women. Physical activity, obesity, and diet-vegetable intake were not significantly different between the two populations. Loglinear analysis indicated that the introduction of race when examining these significant demographic non-behavioral and behavioral findings, had little effect on previous chi-square analysis findings. Sexual orientation was found to be the main effect on the findings with the exception of educational attainment and health insurance. Findings from this study may be used to develop comprehensive, appropriate, culturally competent, interventions, in addition to advocating in areas of public policy to address the breast cancer risks of lesbians.

LIST OF ABBREVIATIONS AND SYMBOLS

%	Percent
f	Frequency
M	Mean
p	The probability that the null hypothesis is correct.
SD	Standard deviation
<	Less than

ACKNOWLEDGEMENTS

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CHAPTER 1

INTRODUCTION

Chances are every person has been touched by cancer whether it be through a personal

diagnosis or the diagnosis of a loved one. Cancer is the second leading cause of death in the

United States, second only to heart disease (Centers for Disease Control and Prevention

[CDC], 2017a). Cancer is defined as a disease in which "some of the body's cells begin to

divide without stopping and spread into surrounding tissues" (National Cancer Institute [NCI],

2015, para. 1). Instead of the normal process of cell replacement, cancer can develop when

abnormal, old or damaged cells survive instead of die and unneeded new cells form and divide

uncontrollably forming masses of tissue called tumors. These tumors can be malignant or

benign. Malignant tumors, unlike those that are benign, can spread to localized regions or to

other parts of the body (metastasize) by traveling through the bloodstream and lymph node

system (NCI, n.d.). According to the Surveillance, Epidemiology, and End Results Program, in

2014 an estimated 14.7 million individuals were living with cancer. An estimated 1.6 million

individuals will be diagnosed with cancer in 2017, with over 600,000 of those dying from the

disease (NCI, 2016).

Breast cancer is the most commonly diagnosed type of cancer in women, regardless of

race/ethnicity, with an estimated 12.4% of U.S. women developing breast cancer during their

lifetime (CDC, 2017b; NCI, 2016). Mortality rates differs among racial and ethnic categories.

Breast cancer is the leading cause of cancer death among Hispanic women, but is second only

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to lung cancer among White, African American, Asian/Pacific Islander, and American Indian/Alaska Native women (CDC, 2017b).

Breast cancer can occur in both men and women, but it is estimated that women are diagnosed with breast cancer at a rate of about 100 times more often than men each year (American Cancer Society [ACS], 2017a). It is estimated that this year approximately 252,710 new cases of invasive breast cancer will be diagnosed in women, with 63,410 new cases of carcinoma in situ (remaining in place – not spreading to other tissues) and that about 40,610 women will die from the disease (ACS, 2017b). Although nationwide attention is given to awareness, prevention, diagnosis, and treatment of breast cancer through many organizations such as Susan G. Komen, the American Cancer Society, the National Cancer Institute, and the National Breast Cancer Foundation, with the height of prevention and early detection campaigns publicized in October as a part of National Breast Cancer Awareness Month, a recent study using cancer incidence rates, forecasting models, and U.S. Census Bureau projections, predicted a more than 50% increase in breast cancer diagnosis rates between the years 2011 to 2030 (NCI, 2016; Rosenburg, Barker, & Anderson, 2015).

Published research has identified several behavioral and non-behavioral risk factors associated with a breast cancer diagnosis. Some of the most common risk factors include age, race/ethnicity, family history, personal health history, menstrual and reproductive history, genetics, having dense breast tissue, tobacco and alcohol use, poor diet and lack of physical activity, body weight (overweight/obese), lack of health care coverage, mammogram compliance, and the use of hormone replacement therapy (National Breast Cancer Foundation [NBCF], 2016). These studies, along with invaluable statistical information from national cancer registries, such as the United States Cancer Statistics (USCS), the Surveillance, Epidemiology,

and End Results Program (SEER), and the North American Association of Central Cancer Registries (NAACCR) are mostly focused on incidence, prevalence, mortality rates, and identifying health disparities among heterosexual women, leaving little to no attention to sexual orientation. These exclusions of sexual orientation data leaves lesbians largely hidden within these cultural and racial groups. For this reason, more information is needed about breast cancer in the lesbian population, a subset of the LGBT population that is estimated to include approximately 10 million individuals in the United States (Gallup, 2017), which many view as an underestimation.

Statement of the Problem

There is limited research available (primary and secondary data analysis) related to breast cancer risk factors in the lesbian population (holistically and by sexual orientation/race) when comparing published research examining breast cancer risk factors among heterosexual women. Limited information can be attributed to research challenges with the population, specifically due to small/non-representative sample sizes, fear of identifying as a member of the LGBT population and unwillingness to participate in studies due to stigma, and the cost of attempting probability sampling on a large scale (Boehmer, Clark, Timm, Glickman, & Sullivan, 2011; Fredriksen-Goldsen, & Kim, 2015; Meyer & Wilson, 2009). The lack of mandatory collection of sexual orientation data in all federal and state-based health surveys also reduces the number of secondary-data analysis breast cancer studies focusing on the lesbian population.

Although some research suggests that lesbians may be at a greater risk of a breast cancer diagnosis when examining breast cancer risk factors, there is an overall hesitancy in definitively supporting the accuracy of those findings. This hesitancy can be attributed to the

previously mentioned challenges, as well as the differences in operationally defining sexual orientation across studies. Because differences in operationally defining sexual orientation varies across studies, comparisons can be extremely difficult (Herdt & Vries, 2004). Typically, sexual orientation is defined using one or more of the following three measures: behavior, attraction, and identify (NCI, 2011b). Consistency among the three measures may not exist. For instance, a woman may choose to engage in occasional same sex activity, but not identify as a lesbian. In this example, behavior and attraction does not align with the traditional label of self-identifying as lesbians, and could affect the validity of the results.

Additional studies are needed to identify, address, and reduce hidden health disparities that may affect vulnerable populations, such as lesbians. The absence of comprehensive lesbian breast cancer studies may affect health promotion and education efforts, funding opportunities for researchers, information to effect changes in health policies, and overall, prove to be detrimental to the health outcomes of members of the population. Recommendations have been made by the Institute of Medicine (2011) and 2014 National Summit on Cancer in the LGBT Communities calling for the need for not only continued research on the topic of breast cancer risks in the lesbian population, but also advocating for the inclusion of sexual orientation in all national cancer registries and national and state level population surveys (Burkhalter et al., 2014).

Purpose of the Study

This dissertation has two purposes. First, I will explore demographic differences and commonly identified behavioral and non-behavioral breast cancer risk factors included in a large, nationwide health survey (age, race/ethnicity, educational attainment, employment status, household income, lack of health care coverage, diet, obesity, physical activity, alcohol

and tobacco use, and mammogram use), by comparing heterosexual and lesbian women. Results of breast cancer risk factor variables will be examined to either confirm or refute previous research findings. Second, I will examine and focus on the significant findings in these reported breast cancer risk factors by examining the intersection of sexual orientation and race using the three largest minority groups, White/Caucasian, Black/African American, and Hispanic women. This will allow exploration of how multiple dimensions of inequality might influence reported breast cancer risk factors. This research will add to the limited existing knowledge base of breast cancer research, especially as it relates to the lesbian population.

It is important to note that bisexual women were not chosen for examination in the study because of the focus of intersectionality in analysis. In a Pew Research Study (2015), fewer bisexual reported incidences of discrimination, were much less likely to experience a "coming out" process, and felt more accepted by society (Parker, 2015). Bisexual women will be included in future research, but at this time, the researcher chose to focus on the lesbian population.

Relevance to Social Work

There are many reasons why this research is relevant to the social work profession. First, lesbians are among the individuals that social workers may encounter daily. Jane Addams, known as the mother of social work, stated in her speech at the National Conference of Social Work in 1930 that "social work's special genius is its closeness to the people it serves" (Johnson, 2004, p. 319). Because of our direct interactions with the public, the NASW Code of Ethics sets out clear expectations of all social workers in gaining knowledge about diverse groups, refraining from discrimination, and providing culturally competent services

and interventions (NASW, 2008). This information would be useful to social workers who provide general case management services to lesbian clients, those in medical settings who assess and evaluate the health needs of lesbian individuals, and provide social workers with lesbian-specific health knowledge to educate interdisciplinary team members.

Second, according to the NASW Standards for Social Work Practice in Healthcare Settings, "a hallmark of social work's commitment to health and well-being is the profession's continued focus on the issue of health disparities in the United States" (NASW, 2016, para. 2). Healthy People 2020, a publication sponsored by the Office of Disease Prevention and Health Promotion [ODPHP], describes a health disparity as, "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage" (ODPHP, 2017, para. 6). The publication goes on to explain that health disparities adversely affect populations that have experienced obstacles in health issues at a greater level when examining characteristics historically linked to discrimination such as race/ethnicity, gender, age, socioeconomic status, and sexual orientation (ODPHP, 2017).

Social workers are directed to address health disparities and issues of discrimination. One of the six core ethical principles of the social work profession is challenging social injustice. According to the NASW Code of Ethics (2008), social workers should engage in the pursuit of social change, particularly for and on behalf of vulnerable and oppressed populations at all levels of intervention, namely micro, mezzo, and macro practice. The vast invisibility of lesbians in breast cancer research is not only discriminatory, but also socially unjust. Because of the social position of lesbians' as a subpopulation of a marginalized, stigmatized group and the prevalence of health disparities within such groups, it is appropriate for social workers to address the breast health needs of the population.

Third, health disparities related to sexual orientation has been identified as a significant concern with troubling gaps in health research (Truman et al., 2011). This research informs social workers who could not only expand on these research findings, but also advocate for health policy changes. According to Cummings, Byers, and Pedrick (2011), policy practice is defined as "using social work skills to propose and change policies to achieve the goal of social and economic justice" (p.2). In doing so, social workers must not only be knowledgeable of existing policies on all levels - organizational, local, statewide, and national, that may affect the well-being of their clients, but also evaluate and analyze those policies to advocate for any necessary modifications or the creation of new policies. Policies should be analyzed using the person-in-environment perspective to not only have an awareness of the systems in which our clients interact, but also to identify and appropriately address systemic barriers that may negatively impact vulnerable individuals or groups and prevent full participation and recognition in society (Cummings, Byers, & Pedrick, 2011). With the knowledge of sexual orientation not included in national cancer registries and in some national and state-level health surveys, social workers should advocate on behalf of the LGBT population for inclusion, so that health disparities within the population can be explored in more depth and addressed through tailored, culturally competent interventions. Thus, this study takes a step forward in addressing health care disparities as a social justice issue and is guided by the following research questions.

Research Questions

1. Are lesbians at a greater risk of a breast cancer diagnosis compared to heterosexual women based on differential levels of known risk factors?

2. Does the intersection of sexual orientation and race have an association with differential levels of known risk factors for breast cancer?

CHAPTER 2

LITERATURE REVIEW

Overview of Breast Cancer

Breast cancer can develop in women of all races, geographic locations, and socioeconomic statuses (ACS, 2016b). It is important to understand how breast cancer develops and be aware of risk factors that may result in an increased breast cancer risk.

Female breasts contain lobular glands (glands capable of producing milk), a system of ducts (tubes that allows the flow of milk from the lobules to the nipple), lymph nodes, blood vessels, and stroma (fatty and connective tissue). Two main types of breast cancer can occur in these tissues – ductal carcinoma in situ (DCIS) (in the ducts), being the most common, and lobular carcinoma in situ (LCIS) (in the lobules) (NCI, n.d.; ACS, 2017c). DCIS can be noninvasive and remain localized in the ducts or progress to areas outside of the ducts (invasive ductal carcinoma). LCIS usually remains localized in the lobules, but because of the possibly of spreading to other tissues (invasive lobular carcinoma), it must be monitored closely (ACS, 2017b). A third type of breast cancer that is not as common, but aggressive, is inflammatory breast cancer. This type of breast cancer does not present lumps, but rather the breast becomes warm, presents as red in color, and swollen. Changes in the skin of the breast, such as dimpling, may also occur (NCI, n.d.).

There are several warning signs that may indicate the presence of breast cancer. Symptoms may include a lump or mass; pain in the breast or nipples; changes in skin, such as color, rashes or skin irritation on the breast or nipple; and changes in the size or shape of the

breasts or nipples, such as dimpling, swelling, nipple retraction, and discharge. (ACS, 2016a).

Lumps can be malignant (cancerous) or benign (non-cancerous). It is important to note that in most instances, lumps are benign. Malignant breast cancer can be localized or metastasize to nearby tissues, and spread to other organs throughout the body (NCI, n.d.).

Invasive breast cancer can be carried to other tissues and organs in the body through the blood and lymphatic system. This system is a network of vessels throughout the body that connect lymph nodes. Lymph nodes that are usually inspected when a breast cancer diagnosis has been made include axillary nodes (located under each arm), internal mammary nodes (located in the chest wall), and supraclavicular or infraclavicular nodes (located above and below the collarbone). If breast cancer is detected in one or more of these nearby lymph nodes, there is an increased likelihood that cancer has metastasized to other tissues and organs (ACS, 2016b).

When a breast cancer warning sign is present, the patient undergoes various investigative, medical tests. If diagnosed with breast cancer, further testing is completed to determine the severity of the diagnosis. Commonly used medical tests include a biopsy, chest x-ray, mammogram, bone scan, magnetic resonance imaging (MRI), computed tomography (CT) scan, a positron emission tomography (PET) scan, tests to examine genetic and hormone receptors, and blood tests. Severity of a breast cancer diagnosis is categorized in stages and grades. The stages, Stage 0 - IV (Stage IV being the most severe and invasive) is determined by the size of the tumor and presence in the lymphatic system and other organs and tissues (ACS, 2015).

When determining the grade of a lump (removed by a biopsy), the appearance and behavior of cancer cells are examined. If the cancer cells appear more normal, the grade is likely to be lower. If the cancer cells appear abnormal, these tumors may grow and spread throughout that body (Susan G. Komen, 2016). Examining breast cancer stages and tumor grades are vital tools in assisting medical professionals in developing treatment recommendations and discussing treatment options with the patient. (ACS, 2015). Tumor grades and criteria are reflected below in Table 1.

Table 1: *Tumor Grades*

Grade 1	The tumor cells look the most like normal tissue and are slow-growing (well-differentiated).
Grade 2	The tumor cells fall somewhere in between grade 1 and grade 3 (moderately differentiated).
Grade 3	The tumor cells look very abnormal and are fast-growing (poorly differentiated).

Susan G. Komen, 2016

Incidence and Mortality Differences in Breast Cancer by Population

Breast cancer incidence and mortality rates are reported through various national cancer registries. Even though sexual orientation is not included in national cancer registries, we know lesbians are present in these statistics, but differences in breast cancer diagnoses and mortality rates are unknown because of the invisibility of the lesbian population within the data.

Incidence and mortality rates for women are reported across racial populations. According to the National Cancer Institute (n.d.), Surveillance, Epidemiology, and End

Results Program [SEER], the total incidence rates for 2010-2014 were as follows: 127.7 were

White, 125.1 were African American/Black, and 93.1 were Hispanic/Latino per 100,000

women. These statistics reflected in Table 2 below show that White women have the highest

incidence rates, but African American women have higher mortality rates.

Table 2: *Incident and Mortality Rates by Race (2010-2014)*

Race	Incidence	Mortality
White	127.7	20.6
African American/Black	125.1	29.2
Hispanic/Latino	93.1	14.4

SEER (2010-2014). The number of new cases of female breast cancer and mortality rates are based on 100,000 women per year. These rates are age-adjusted and based on 2010-2014 cases and deaths.

Breast Cancer Risk Factors

In determining the risks believed to be associated with developing breast cancer,

researchers have identified behavioral and non-behavioral related factors. Although these risks

are widely accepted as possible factors, we must keep in mind that if an individual presents one

or more of these risk factors it does not necessarily mean a breast cancer diagnosis is inevitable

(ACS, 2015).

Behavioral Risks

Behavioral risks for breast cancer include tobacco use, alcohol consumption, diet,

weight, use of birth control and hormone replacement therapy, childbearing status, and lack of

physical activity (ACS, 2015). Behavioral risks analyzed in this study are alcohol consumption,

diet, obesity, mammogram use, physical activity, and tobacco use. Rates of mammogram use is

included in this study as a behavioral risk for a late stage breast cancer diagnosis and will also

be analyzed.

 Alcohol Consumption. A clear link between breast cancer and alcohol use does appear to exist. Over 100 epidemiologic studies have confirmed the link between breast cancer and alcohol (NCI, 2013). In women, alcohol consumption can alter the way estrogen is metabolized; thereby, increasing blood estrogen levels and increasing breast cancer risk (Susan G. Komen, 2017a). One meta-analysis study of 53 case-control and cohort studies found that women who consumed approximately three drinks daily had a 1.5 times risk of developing breast cancer compared to non-drinkers, with the risk increasing by 7% for each additional daily drink (Hamajima et al., 2002).

 Alcohol use among lesbians varies across studies (Austin, Pazaris, Rosner, Bowen, Rich-Edwards, & Spiegelman, 2012; Case, Austin, Hunter, Manson, Malspeis, Willett, & Spiegelman, 2004; Roberts, Dibble, Scanlon, Paul, & Davids, 1998; Zaritsky & Dibble, 2010). For example, Austin et al. (2012) used a breast cancer risk assessment tool and found an overall higher risk of breast cancer in the lesbian population. When examining alcohol use, the researchers found significantly higher rates of alcohol use as compared to heterosexual women. Case et al. (2004) examined the alcohol use of 694 lesbians and found that lesbians in their study were more likely to drink heavily at a rate of 60 or more drinks a month. A data review report of the National Survey on Drug Use and Health [NSDUH] in interviews completed in 2015 with approximately 3,000 sexual minority individuals also found that lesbians were more likely to drink alcohol compared to heterosexual women. The report revealed that 64% of self-identified lesbian reported alcohol use as compared to 51% of heterosexual women (Medley, Lipari, & Bose, 2016). Other studies reported differences that were not statistically significant in alcohol use between lesbians and heterosexual women (Roberts et al., 1998; Zaritsky &

Dibble, 2010).

Examining alcohol use by race, the National Institute on Alcohol Abuse and Alcoholism, reported that more white women identify as current drinkers followed by African American, and Hispanic women, but African American women and Hispanic women reported higher rates of binge drinking (Chartier & Caetano, 2010). Very few studies include alcohol consumption stratified by gender, sexual orientation, and distinct racial categories (Mereish & Bradford, 2014; Hughes et al., 2006). In these studies, African American lesbians reported higher rates of drinking alcohol compared to White lesbians and African American and Hispanic lesbians were more likely to report having an alcohol use problem.

Diet. A diet rich in fruits and vegetables may assist with weight control and slightly decrease the risk of a breast cancer diagnosis (Aune, Chan, Vieira, Rosenblatt, Vieira, Greenwood, & Norat, 2012; Jung et al., 2013). Studies reporting nutrition and diet patterns of the lesbian population are sparse and vary by definition of diet and comparison groups. In a study by Valanis, Bowen, Bassford, Whitelock, Charney, and Carter (2009), found that lesbians reported lower intake of fruit and vegetables compared to heterosexual women. Zaritsky and Dibble (2010) found that more lesbians reported eating a low-fat diet compared to heterosexual women. Examining fruit/vegetable intake by comparing to nationally suggested intake standards, Grindel, McGehee, Patsdaughter, and Roberts (2006) found that lesbians met recommended daily standards by consuming at least two servings of fruit and vegetables per day.

Examining race and gender, white and Hispanic women were found to report higher rates of fruit and vegetable intake compared to African American women (Blanck, Gillespie, Kimmons, Seymour, & Serdula, 2008). There were no studies found that examined the dietary

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patterns of lesbians stratified by race.

Mammogram Use. Early detection and screening practices can reduce the risk of a late stage diagnosis and reduce a woman's chances of dying from breast cancer (Susan G. Komen, 2015). Breast cancer discovered early using screening tests and diagnostic tools are many times, more likely to be smaller and confined to the breast (ACS, 2015). Current breast cancer screening recommendations by the American Cancer Society (2017d) are reflected in Table 3 below.

Table 3: *American Cancer Society Recommendations for Early Detection of Breast Cancer*

Recommendations for women at an average risk: no personal breast cancer history, family history, genetic mutation (BRCA), and no chest radiation history before the age of 30.	
Age	Recommendation
40-44	Annual mammogram – optional
45-54	Annual mammogram
55 and older	Mammogram every two years or continue annual. Should continue if in good health and life expectancy is 10+ years.
████████████████████████████	
High risk – risk assessment of lifetime risk of 20-25% or more, known BRCA1 or BRCA2 gene mutation and first-degree relative with same, chest radiation between the ages of 10 and 30.	
30 (earlier optional)	Annual MRI and mammogram

American Cancer Society, 2017d

Barriers to using early detection and screening tools vary. The most common barrier to having a mammogram is the lack of health insurance (ACS, 2017e). Lack of adequate health insurance has shown to have a significant impact on the use of early detection and screening practices. In 2015, an estimated 31% of women ages 40 and older without insurance had a

mammogram in a two-year period, as compared to 68% of women with health insurance (ACS, 2015). Even with adequate health insurance, the costs of early detection and screening and treatment can deter or delay action, especially those with a lower socioeconomic status, which can result in lower adherence rates to recommended screenings and delayed care (ACS, 2017e).

According to the ACS (2017e), more African American women (69%), age 40 and older reported mammogram use in the past two years compared to 65% of White women and 61% of Hispanic women. Researchers have found that similar cultural beliefs in African American and Hispanic women may serve as barriers to breast cancer early detection and screening use. For instance, members of both populations were found to have a fatalistic view of breast cancer (predestined and therefore, no reason to adherence to screening recommendations (Balshem, 1991; Perez-Stables, Sabogal, Otero-Sabogal, Hiatt, & McPhee., 1992; Peek, Sayad, & Markwardt, 2008). Additional barriers reported by Hispanic women include lack of knowledge about breast cancer, avoidance due to fear of a cancer diagnosis, prayer as a protective factor from getting a breast cancer diagnosis, lack of knowledge about mammogram screening recommendations, modesty and embarrassment, fear of a painful mammogram, and language barriers (Deavenport, Modeste, Marshak, & Neish, 2010; Ell, Vourlekis, Lee, & Xie, 2007. In African American community, additional cultural belief barriers include mistrust in physicians, poor patient-provider relationship and communication, fear of a cancer diagnosis, along with the centrality of religion and thinking by some that prayer and faith in God is the cure to a cancer diagnosis are additional barriers that can result in poor early detection and screening use (Gregg & Curry, 1994; Peek, Sayad, & Markwardt, 2008).

There are some studies that indicate that lesbians may have less mammogram use compared to heterosexual women and not following recommended prevention guidelines (Cochran et al, 2001; Fayanju, Kraenzle, Drake, Oka, & Goodman, 2014; Kerker, Mostashari, & Thorpe, 2006; Valanis, et al., 2000). Other studies found no statistically significant differences in ever having a mammogram and/or a mammogram in the last two years among these populations (Diamant, Wold, Spritzer, & Gelberg, 2000; Dibble, Roberts, & Nussey, 2004; Roberts et al., 1998; Zaritsky & Dibble, 2010).

In contrast, a study by Grindel (2006) found that when comparing lesbians' mammogram use to ACS screening guidelines, the majority of lesbians (57.1%) 40 and older followed recommended guidelines. Results from a recent population survey reports higher use of mammograms by lesbians compared to heterosexual women. The 2015 Health Interview Survey reflected higher mammogram use by lesbians (62%) age 40 and older in the past year compared to heterosexual women to be 50.1%. Rates of mammogram use was also higher among lesbians (78.2%) when examining use within the past two years compared to heterosexual women (64.3%). Research has found that some reasons for disparities in the use of mammograms in the lesbian population include lack of insurance, fear of discrimination and substandard care, poor physician-patient interactions, and the belief of less perceived breast cancer risk can reduce rates of screening use (Hart & Bowen, 2009; Heck, Sell, & Gorin, 2006; Smith, Johnson, & Guenther, 1985). No studies were found that examined mammogram use in lesbians across racial categories.

Obesity. Making a definitive connection between breast cancer risk and being overweight or obese is more complex and differs between pre- and postmenopausal women. Studies have shown that gaining weight before and after menopause can increase breast cancer

risk (Eliassen, et al., 2006; Vrieling, Buck, Kaaks, & Chang-Claude, 2010; Emaus et al., 2014). One large study found that women who gained about 20 pounds after the age of 18 had a 15% higher risk compared to those who gained less or no weight (Eliassen et al., 2006). The risk is greater for postmenopausal women. Eliassen et al. (2006) found that if weight gain of 20 or more pounds occurs after menopause, women have an 18% higher risk of a breast cancer diagnosis. This difference in risk may be explained by higher levels of blood estrogen after menopause. The main source of estrogen after menopause comes from fat tissue rather than the ovaries (Susan G. Komen, 2017b). Enzymes contained in fat tissue called aromatase converts hormones (androgens) to estrogen. This results in larger amounts of blood estrogen levels in heavier women, therefore possibly increasing breast cancer risk (Susan G. Komen, 2017b).

Breast cancer risk studies that examined obesity/BMI consistently found lesbians to be heavier and/or obese as compared to heterosexual women (Austin et al., 2012; Brandenburg, Matthews, Johnson, & Hughes, 2007; Case et al., 2004; Cochran et al., 2001; Dibble, Roberts, & Nussey, 2004; Roberts et al., 1998; Valanis et al., 2000; Zaritsky & Dibble, 2010). When examining sexual orientation and race, Deputy and Boehmer (2014) found higher rates of obesity in White and African American women, but lower rates in Hispanic women compared to their heterosexual counterparts. Obesity rates in the general U.S. population reflect stark differences between races. The National Health and Nutrition Examination Survey (2011-2014) showed that African American women had the highest rate of obesity (56.9%), followed by Hispanic women (45.7%), and White women (35.5%) (Ogden, Carroll, Fryar, & Flegal, 2015).

Physical Activity. Physical active reduces the risk of obesity and risk of a breast diagnosis in all women, but especially postmenopausal women (Wu, Zhang, & Kang, 2013; Eliassen, Hankinson, Rosner, Holmes, & Willett, 2010; Fournier et al., 2014). The question still exists relative to how much exercise is needed. A prospective cohort study of 74,171 women aged 50-79, recruited by 40 clinical health centers from 1993-1998 found that exercising 1.25 to 2.5 hours a week may reduce the risk of developing breast cancer by as much as 18% in postmenopausal women (McTiernan et al., 2003).

Studies examining physical activity in lesbians vary by measures. Zaritsky and Dibble (2010) found that lesbians exercised fewer times per week compared to heterosexual women. Although it was mentioned earlier that many studies show consistent rates of obesity in lesbians, Dibble, Roberts, and Nussey (2004) reported no significant difference between lesbians and heterosexual women in the frequency, level, or duration of weekly exercise habits.

Physical activity differs by race. Hispanic women have high rates of inactivity, which may be explained by cultural factors related to larger body types being viewed more positively and often associated with marriage and motherhood (Keller & Fleury, 2006). More positive body perception is also found in the African American as compared with White women, unfortunately this also translates in lower rates of physical activity and higher rates of obesity (Mama, Quill, Fernandez-Esquer, Reese-Smith, & Banda, 2011). There were no studies found that examined physical activity and sexual orientation by race.

Dietary Guidelines for Americans also includes recommended levels of weekly exercise (ODPHP, 2015). Two and one-half hours of moderate intensity exercise is recommended for adults ages 18-64. See additional recommendations in Table 4 below.

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Table 4: *Dietary Guidelines for Adults (Exercise)*

18-64	All adults should avoid inactivity. Some physical activity is better than none, and adults who participate in any amount of physical activity gain some health benefits.
	For substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Aerobic activity should be performed in episodes of at least 10 minutes, and preferably, it should be spread throughout the week.
	For additional and more extensive health benefits, adults should increase their aerobic physical activity to 300 minutes (5 hours) a week of moderate-intensity, or 150 minutes a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity activity. Additional health benefits are gained by engaging in physical activity beyond this amount.
	Adults should also include muscle-strengthening activities that involve all major muscle groups on 2 or more days a week.
65 and older	Older adults should follow the adult guidelines. When older adults cannot meet the adult guidelines, they should be as physically active as their abilities and conditions will allow. Older adults should do exercises that maintain or improve balance if they are at risk of falling.
	Older adults should determine their level of effort for physical activity relative to their level of fitness.
	Older adults with chronic conditions should understand whether and how their conditions affect their ability to do regular physical activity safely.

ODPHP, 2015

Tobacco Use. Although cigarettes contain several known carcinogens, the link between smoking and breast cancer is debated (ACS, 2015). Long-term heavy smoking (20+/day) appears to present a higher risk of developing breast cancer (ACS, 2015). A 2010 study also linked tobacco use starting at an early age to increased breast cancer risk. In a cohort study of 73,338 women followed over 13 years, Gaudet, Gapstar, Sun, Diver, Hannan, and Thun (2013) found that women who started smoking after their first menstrual

cycle had a 12% higher risk of developing breast cancer. Smoking initiation at a younger age has also been found to be associated with high nicotine dependence that continues into adulthood (Buchmann et al., 2013; Hu, Davies, & Kandel., 2006).

Many studies have documented a high rate of tobacco use among lesbians as compared to heterosexual women (Case et al., 2004; Cochran et al., 2001; Valanis et al., 2000). Also, in a report, published by the CDC, *Current Cigarette Smoking Among Adults – United States, 2005-2014*, found that 1 in 4 lesbians smoked cigarettes as compared to 1 in 6 heterosexual women (CDC, 2016a). But, there are studies that report conflicting findings. According to a data review report of the National Survey on Drug Use and Health [NSDUH] in interviews completed in 2015 with approximately 3,000 sexual minority individuals, self-identified lesbians (54%) reported lower rates of daily tobacco use as compared to heterosexual women (63%) (Medley, Lipari, & Bose, 2016). Dibble, Roberts, and Nussey (2004) examined tobacco use in 324 matched heterosexual/lesbian sisters (N=648) and found no significant differences in current tobacco use, however more lesbians reported a history of use. Other contradicting research reported lower tobacco use among lesbians as compared to heterosexual women (Roberts, Dibble, Scanlon, Paul, & Davids, 1998; Zaritsky & Dibble, 2010).

Tobacco use varies also by race. According to the National Health Interview Survey (2005-2014), white women have the highest rates of smoking (17.2%), followed by African American (13.7%) and Hispanic (7.6%) women (CDC, 2016a). When examining sexual orientation and race, higher rates of tobacco use was also observed. In a review of the National Adult Tobacco Survey (2009-2010), Fallin, Goodin, and King (2015) reported that more African American lesbians identified as current smokers, followed by Hispanic and White lesbians compared to their heterosexual counterparts.

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Non-behavioral risks

Risk factors that are non-behavioral include gender/sex, aging, genetic, family history, previous breast cancer diagnosis, race and ethnicity, dense breast tissue, and development of benign breast conditions (ACS, 2015). The two strongest risk factors of a breast cancer diagnosis is being female and aging (NCI, 2016), Non-behavioral risks analyzed in this study are gender/sex, age, socioeconomic status, and race/ethnicity.

Age. Aging also increases a woman's risk of developing breast cancer. Incidences of breast cancer increases with age, especially in postmenopausal women. Statistics show an increase of breast cancer in women over 40, with the median diagnosis age at 62 (Howlader et al., 2016). This differs across races. African American women are usually diagnosed earlier than White women, at a median age of 59 (Howlader et al., 2016).

Gender/Sex. Men are at risk for developing breast cancer, but being a woman is the highest risk for developing breast cancer (NCI, 2016).

Race/Ethnicity. Along with gender/sex, race and ethnicity plays an important role is assessing breast cancer risks. As mentioned earlier, breast cancer incidence and mortality statistics show more White women being diagnosed with breast cancer, but more African American/Black women dying from breast cancer. Some possible reasons for this disparity includes lower income, barriers to screening such as lower rates of health insurance, higher stage at diagnosis, and the increased incidence of Triple Negative breast cancer, an aggressive of breast cancer that is more difficult to treatment compared to other types (Bradley, Given & Roberts, 2002: Ayanian, Kohler, Abe, & Epstein, 1993; Furberg, Millikan, Dressler, Newman, & Geradts, 2001; Servick, 2014). Additional breast cancer risk factors that might explain breast cancer diagnosis rates between groups include age at first period, age at menopause, age

at first childbirth, body weight, breastfeeding, number of child births, and hormone replacement use (Willett et al., 2014). For example, White women typically have fewer children later in life compared to African American and Hispanic women. Because of this, White women may be exposed to blood estrogen hormones for a longer duration compared to African American and Hispanic women (Banegas, Leng, Graubard, & Morales, 2013; Li, Gilliland, Baumgartner, & Samet, 2002; Willett et al., 2014). Although like African American women, Hispanic women have more children at an earlier age compared to White women, their breast cancer risk may increase if they adopt a more Western diet (Murtaugh et al., 2008).

There are also differences in rates of breast cancer diagnosis when examining intersections of age and race. Rates of a breast cancer diagnosis in African American women younger than 45 are higher compared to White women. In contrast, White women over the age of 60 are more likely to be diagnosed with breast cancer compared to African American women (ACS, 2015).

Also, triple negative breast cancer is more common in African American women. This type of breast cancer is more difficult to treat and has a poorer prognosis compared to other types of breast cancer. Reasons for this disparity is still be studied, but some research suggests that having lower breastfeeding rates, which reduces estrogen levels and postpones resumption of menstrual cycle, and the tendency of excessive abdomen weight in African American women may increase risk of Triple Negative breast cancer (Shinde, et al., 2010; n et al., 2014).

Socioeconomic Status (SES)/Education. Research has shown that women at higher levels of SES or education is more at risk for breast cancer. Factors that may increase this risk include alcohol use and longer exposure to hormones through nullparity, having fewer

children or at a later age, and use of birth control, hormone replacement therapy, and higher rates of mammogram use (Pudrovska & Anikputa, 2012; Heck & Pamuck, 1997; Krieger, 2010). Individuals with a lower SES can also be at a higher risk of cancer in general due to lack of health insurance and access to quality health care due to geographic location and transportation issues (O'Keefe, Meltzer, & Bethea, 2015).

Breast Cancer Risk Assessment Tools

Some breast cancer risk studies include the use of risk assessment tools, such as the Gail Model, the Claus Model, and Rosner-Colditz Model. The following are examples of studies using these risk assessment tools often cited when discussing higher breast cancer risk in the lesbian population.

Gail Model. The Gail Model is a breast cancer risk assessment tool developed by researchers at the National Cancer Institute and the National Surgical Adjuvant Breast and Bowel Project. This tool calculates a woman's risk of developing breast cancer not only within the next five years, but also estimates risk of developing breast cancer within a woman's lifetime (up to age 90). The model is not predictive of a breast cancer diagnosis, but rather gives an average risk for women who indicate similar risk factors. Risk factors include age, age at first period, age at the time of birth of first child/no live births, family history of breast cancer (mother, sister, or daughter), number of past breast biopsies, number of breast biopsies showing atypical hyperplasia, and race/ethnicity (Gail, Brinton, Byar, Corle, Green, Shairer, & Mulvihill, 1989). There are limitations to the use of the Gail Model. The model does not include all known breast cancer risk factors. It does not include paternal family history or age of onset of relatives diagnosed with breast cancer. This may lead to an underestimation of risk. Initially, validated for white women, it has now been

updated for use with the African American, Asian, and Pacific Islander populations. It is not recommended for use in women with a history of ductal carcinoma in situ or lobular carcinoma, a strong family history of breast cancer, a history of invasive breast cancer, previous treatment with radiation to the chest for Hodgkin lymphoma, and those with a known mutation in either the BRCA1 or BRCA2 gene. Even with these current limitations, the model is one of the most commonly used assessment tool and is widely regarded as a useful tool to estimate breast cancer risk (National Cancer Institute, 2011a).

Using the Gail Risk Model, Brandenburg et al. (2007) used self-reported data collected from a Multisite Women's Health Study (1994-1996) that surveyed 550 self-identified lesbians (n=75 African American, n=418 White, n=57 Other) and 279 urban (Chicago, New York City, and Minneapolis/St. Paul), heterosexual women (n=42 African American, n=200 Caucasian, n=29 Other) to calculate breast cancer risk in lesbians and heterosexual women using the Gail Risk Model. Researchers found that lesbians were at a significantly higher 5-year breast cancer risk (t (827)=-2.04, p=.04, M=.96, SD=.78) as compared to heterosexual women (M=.85, SD=.78). After adjusting for education, race, and study site location, the authors used a multiple linear regression model to confirm this higher risk among lesbians (B=.11, SD=.06, t (797)=1.96, p<.05). Limitations of the Gail Risk Model, along with a non-representative sample (highly educated and predominately White), limits the generalizability of the study.

Claus Model. The Claus Model estimates the probability of a breast cancer diagnosis based on family history of cancer and the age at which first and/or second-degree maternal or paternal relatives were diagnosed with breast cancer. The model calculates lifetime probabilities of developing breast cancer and estimated risk of developing cancer

over 10-year intervals. Use of the Claus Model is limited because it does not take other breast cancer risks into consideration. (Claus, Risch, & Thompson, 1993,1994).

In a 2001 study by McTiernan et al., researchers compared estimates of breast cancer risk using the Gail and Claus model with two samples – a general sample of 317 participants (all Caucasian, M=42.2, SD=11) and a second sample of 174 participants in Seattle, Washington - 27 African Americans (M=43.9, SD=11.5), 65 lesbians (M=40.8, SD=8.7), 82 Ashkenazi Jewish (M=46.6, SD=9.9) between the ages of 18 and 74, all with a family history of cancer (first or second-degree relative).

Samples were recruitment using different methods. First, the general sample were recruited in two ways – from a population-based study at a local cancer research center and through a breast cancer clinic, both in the state of Washington and by using a TV and radio press release and print media advertising a study of counseling for those with a family history of breast cancer. The second sample was recruited through media, health fairs, and community/religious organizations. Variables included from the Gail model were age, age at menarche, age at first live birth, nulliparity, number of previous breast biopsies, biopsy with atypical hyperplasia, and number of first and second-degree relative with breast cancer.

The researchers used the Claus Model and a modified version of the Gail Model. This modified model purports to be more accurate with assessing breast risk in African American women. Overall, the researchers believe the modified Gail Model to be more accurate. The 5-year risk and lifetime risk of developing breast cancer were calculated for participants. Lesbians were significantly less likely to have ever been pregnant or had a live birth. The women in the general sample were significantly more likely to report a first-

degree relative with a breast cancer history. The general sample (32.8%) was found to have the highest 5-year risk of developing breast cancer, followed by Ashkenazi Jewish (31.7%), lesbians (18.5%), and African American women (3.7%). When calculating the lifetime risk of breast cancer, researchers found that again the general sample (M=51.3, SD=25.1) had the highest lifetime risk of developing breast cancer, followed by African American women (M=51.3, SD=29.9), lesbians (M=45.6, SD=24.5) and Ashkenazi Jewish women (M=44.3, SD=24.9). The Gail Model estimated a higher risk of developing breast cancer for all participants as compared to the Claus Model. These models have differing variables, which may explain the difference in estimation.

There are many risk factor variables not included in the assessment, such as alcohol and tobacco use, obesity, diet, physical exercise. Also, recruitment efforts were different between the two samples. It is likely that the first sample which included recruitment of women from a breast cancer clinic were possibly already at a higher risk for developing breast cancer.

Rosner-Colditz. The Rosner-Colditz model expands on the Gail model and includes subsequent births, type of (natural or surgical), age at first period, age at menopause, weight, height, and alcohol consumption. Researchers determined in a large prospective cohort study (sample size – 130,000 individuals over a 14-year period) that this model more accurately predicts the likelihood of developing breast cancer than the Gail Model, especially the 5-year risk for women ages 47 to 69 (Spiegelman, Colditz, Hunter, & Hertzmark, 1994; Colditz & Rosner, 2000; Rosner & Colditz, 1996) This model has been used in breast cancer risk research with lesbians. Austin et al. (2012) examined sixteen years of self-reported, prospective data from a large cohort of women to estimate breast

cancer risk. The sample size consisted of 87,392 premenopausal women (665 lesbians, 309 bisexual women, and 86,418 heterosexual women) ranging in age of 25-58 years). The researchers reported a slightly higher incidence rate (IR) of developing breast cancer in both lesbians and bisexual women compared to heterosexual women during the premenopausal period. Also, they reported a higher lifetime (up to age 90) breast cancer risk in lesbians. The majority of participants were heterosexual (86,418), white women (80,778) and therefore generalizability is limited to the lesbian population.

Theoretical Framework: Intersectionality

Intersectionality is the framework that guides my study. Strongly influenced by feminist and social justice theoretical approaches, intersectionality assists in understanding overall societal challenges and intersecting dimensions of inequalities faced by members of the oppressed and marginalized populations, including lesbians. Although the intersectionality perspective was first used in an essay by a critical race scholar named Kimberle Williams Crenshaw in 1989 (International Socialist Review, 2015), the principals of intersectionality were used before that time by black activists, feminists, and a variety of other scholars to discuss complex relationships and factors that affect human lives (Bunjun, 2010, Collins, 1990; Van Herk, Smith & Andrew, 2011). This framework examines the multiple identities of individuals (e.g. female, lesbian, African American) and the ways in which they interact and recognize simultaneous dimensions of inequality. Intersectionality is used to understand principles of social inequality and its connection to marginalized communities based on race, ethnicity, socioeconomic class, and geographic locations (Weber, 2010). This perspective considers the social construction of race, institutionalized practices and policies of inequality (social, structural, political), acknowledges the importance of the way members of minority

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populations are viewed and depicted in society, and the historical and social experiences within and between sexual and gender minority groups with respect to the multiple dimensions in which they identify (Dill & Zambrana, 2009; Weber, 2010).

There is a growing focus on intersectionality and its use as a valuable research paradigm in health research, specifically when examining health inequalities (Hankivsky, 2011; Iyer, Sen, & Ostlin, 2008). Since health occurs within a social context, marginalized status is linked to disparities in health outcomes (Braveman, Vubbin, Egerter, Williams & Pamuk, 2010; Mulia, Ye, Zemore, & Greenfield, 2008; Williams & Muhammed, 2009). A consideration of marginalized status (ex. sexual orientation, sex, race/ethnicity) and health must include attention to the complex nature of intersecting dimensions of inequalities (Hankivsky & Christoffersen, 2008). Much health research has ignored multiple dimensions within LGBT communities (IOM, 2011), without exploring how LGBT health is differentiated by social position. Given the powerful influence of race on health outcomes, especially in the area of breast cancer, this study examines the sexual orientation and breast cancer risk factors, along with the intersectionality of race and sexual orientation and breast cancer risk factors.

Feminist Theory. The feminist movement, beginning in the 1960's, was created to oppose oppression, patriarchal power, inequalities, and challenge socially-created norms related to gender and sexual identities. The focus of feminist theory continues to be centered on the rights of vulnerable and historically oppressed populations in having a voice and to share their experiences and be heard. The exclusion of lesbians in national cancer registries and health related research confines them to a subordinate position in society, neglecting identification of their health needs, and may result in poor health outcomes.

Feminist theory in health inequality research uses a macro view of structural and systemic barriers and their effects on the health and well-being of minority population. Realizing this, some researchers have suggested feminist theory as a necessity in health disparity research (Ruzek, Olesen, & Clarke, 1997; Weber & Parra-Medina, 2003).

Social Justice. Similar to feminist theory and intersectionality, social justice addresses inequalities at all levels. In social work, social justice is a core value and calls for not only advocacy on behalf of vulnerable populations, but combating and seeking to eliminate discrimination based on age, *sex*, *race, ethnicity*, national origin, *sexual orientation*, gender identity or expression, marital status, religion, political belief, immigration status, or mental or physical disability (NASW, 2008). Addressing the unjustness of health disparities and invisibility of lesbians in breast cancer risk research are issues that align with ethical standards and foundational beliefs of the social work profession.

These three frameworks, in addition to prior literature on breast cancer risk factors in the lesbian population is what led me to choose the variables of research in this study.

Restatement of Research Questions and Formulated Hypotheses

The current state of research regarding breast cancer risk in the lesbian population varies as to whether lesbians are at a higher risk for a breast cancer diagnosis. Continued examination and research that may be able to confirm or dispute findings is needed Taking the previous state of breast cancer research related to lesbians and race into consideration, I have formulated the following hypotheses.

Research Question 1:

Are lesbians at a greater risk of a breast cancer diagnosis compared to heterosexual women based on differential levels of known risk factors?

Hypothesis 1: Lesbians will have higher rates of demographic/non-behavioral and behavioral risk factors for breast cancer risk compared to heterosexual women.

Research Question 2:

Does the intersection of sexual orientation and race have an association with differential levels of known risk factors for breast cancer?

Hypothesis 2: The intersection of sexual orientation and race will be associated with differential levels of breast cancer risk factors.

CHAPTER 3

RESEARCH METHODS

Data Set

The Behavioral Risk Factor Surveillance System (BRFSS), the largest nationwide health-related survey, collects health-related data from all 50 states, including the District of Columbia, Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and Palau. The survey includes collecting health information on topics such as HIV/AIDS, stroke, asthma, arthritis, cardiovascular health, diabetes, and health care access. The survey consists of a core module that includes mandatory questions for each state. Optional modules are provided that can be adopted by individual states, such as sexual orientation and breast cancer screening.

The BRFSS was chosen by the researcher because it 1) contains a larger number of self-identified lesbians as compared to other reviewed national health surveys, 2) uses a standardized sexual orientation question, and 3) includes behavioral and non-behavioral risk factors of breast cancer that is of interest to the researcher. As mentioned earlier, research with the LGBT population can be challenging, especially in locating and securing participation by an acceptable number of the population. Because the BRFSS now contains a standardized sexual orientation question, this makes it possible for researchers to have access to readily available data for analysis of new research and further examination of existing research with the LGBT population. Questions related to sexual orientation have been included in the BRFSS by various states in the past, but lacked consistent language. In 2013, the BRFSS developed a standardized question to collect data on sexual orientation. This question was made available to US states and

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territories for use as an optional module question beginning in 2014. The standardized question is as follows: Do you consider yourself to be: 1) Straight; 2) Lesbian or Gay; 3) Bisexual; 4) Other; 7) Don't know/Not sure; 9) Refused. This direct, self-reported approach to the question of sexual orientation provides the consistency and ability for comparison that data was lacking prior to 2014.

Data Collection

Annual BRFSS datasets are available on the CDC/BRFSS website. The 2014 and 2015 datasets were downloaded and combined for use in the study. The BRFSS uses Random Digit Dialing (RDD) techniques on landlines and cell phones to collect data from non-institutionalized adults ages 18-64. State health departments collaborate with the CDC in developing the surveys. Many questions have been tested by other well-established national surveys such as the National Health Interview Survey. When a new question is proposed, it must go through a process of field testing prior to inclusion in the BRFSS. Each state health department is responsible for conducting the interviews using internal personnel or contractors. Extensive and ongoing training is provided to all interviewers. After collection, data is sent to the CDC where it is edited, processed, weighted, and analyzed. Datasets are eventually released and available for downloading on the CDC website.

Mandatory Core/Optional Modules Used in Analysis

As with the sexual orientation question, there were other modules available for use by US states and territories, but not mandatory. Table 5 below reflects the topics in 2014 and 2015 that contained questions selected for data analysis.

Table 5: *BRFSS Questionnaire - List of Sections/Modules Included in Study*

2014	2015
Alcohol Consumptions (Section 10)	Alcohol Consumption (Section 9)
Breast and Cervical Cancer Screening (Section 15)	*Breast and Cervical Cancer Screening (Module 14-optional)*
Demographics (Section 8)	Demographics (Section 7)
Exercise (Section 4)	Exercise/Physical Activity (Section 11)
Health Care Access (Section 3)	Fruits and Vegetables (Section 10)
Sexual Orientation & Gender Identity (Module 16-optional)	Health Care Access (section 3)
Tobacco Use (Section 9)	*Sexual Orientation & Gender Identity (Module 21 – optional)*
	Tobacco Use (Section 8)

Exclusion criteria

Since sexual orientation is an optional question, only the twenty-eight states and one U.S. territory that collected this data were included. These states and territories were Colorado, Connecticut, Delaware, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Minnesota, Missouri, Montana, Nevada, New York, Ohio, Pennsylvania, Texas, Vermont, Virginia, West Virginia, Wisconsin, Wyoming, and Guam.

Due to the population of focus, men and bisexual women were excluded. Many studies related to the lesbian population do include bisexual women, but for the purposes of this study the researcher chose to focus solely on respondents that self-identified as members of the lesbian population in order to gain a more accurate understanding of their breast cancer risks.

All women ages 18 and older were included. Although breast cancer risk factors increase with age, it is important to examine risk factors that could increase breast cancer risk factors Because of the low numbers, only respondents in the three largest populations were included – White/Caucasian, Black/African American, and Hispanic. The selection aligns with U.S. Census data findings related to the top three race categories in the United States.

Using a large survey of this kind, missing data is expected. All partial/incomplete interviews were deleted. Respondents that did not answer the sexual orientation question were deleted. Answers to examined variables such as don't know/not sure and refused were coded as missing values and therefore not used in the analysis. The total population included in the combined landline and cellular telephone dataset was 906,120. After exclusion criteria was met, the sample size was 162,318 consisting of 160,780 heterosexual women and 1,538 lesbians. Because of the vast difference in number between the two sexual orientation categories, to equate the sample sizes between lesbians and heterosexual women, an approximate 1% random sample of heterosexual women was selected. The resulting sample size of heterosexual women was 1,544. The exclusion/inclusion process is explained below in Table 6.

Table 6: *Selection of Participants*

	Selection Criteria	Total after selection criteria
Step 1	Combined BRFSS Datasets, 2014, 2015 Total Population	906,120
Step 2	Sex: Excluded Men	526,212
Step 3	Excluded incomplete interviews	462,285
Step 4	Sexual Orientation: Excluded U.S. states without SO question	183,238
Step 5	Race: Excluded all except White/Caucasian, African American, Hispanic	169,410
Step 6	Sexual Orientation: Excluded Bisexual	167,071
Step 7	Sexual Orientation: Excluded Other	166,552
Step 8	Sexual Orientation: Excluded Don't know/Not sure/Refused/Missing	162,318
	Heterosexual Women	160,780
	Selected an approximate 1% random sample of Heterosexual Women	**1544**
Step 9	Self-identified Lesbians	**1538**

Procedures for Data Analysis

Data analysis was completed using the SPSS Statistics Version 24 package.

The primary independent variable is *sexual orientation*. The dependent variables include

demographic/non-behavioral (age, race/ethnicity, educational attainment, employment status,

household income, and having a health care plan) and behavioral risk factors for breast cancer

(alcohol consumption, diet, mammogram use, physical activity, tobacco use, and obesity). The

data analysis will involve four significant steps. Step 1 will include frequencies of variables to

capture characteristics of the population. Step 2 will include an exploration of the similarities and

differences between heterosexual women and lesbians, using the independent variable *sexual

orientation* in comparison with selected demographic/non-behavioral and behavioral breast

cancer risk factors. This will involve the use of crosstabs and chi-square analysis to examine

significance.

The third step will involve loglinear regression analysis to examine

associations/interactions among sexual orientation, race, and statistically significant variables

found in the previous chi-square analyses. Loglinear analysis is an appropriate method of data

analysis when determining a statistically significant association or interaction among three or

more categorical variables (Tabachnick & Fidell, 2012. Loglinear analysis uses a logarithm of

frequencies within a contingency table to develop models to fit the data. In hierarchical loglinear

analysis, the most restrictive model (interactions between all variables) is developed and then

continues to ultimately arrive at the least restrictive model (Belle, Fisher, Heagerty, & Lumley,

2004). This analysis of the variables allows the identification of association/interactions between

variable combinations resulting in identification of statistical significance at three-way and two-

way interactions (Belle, Fisher, Heagerty, & Lumley, 2004). Loglinear analysis will be

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performed only if a dependent variable is found to be significantly related to sexual orientation. If significant, associations will be examined between sexual orientation, race (White/Caucasian, African American, and Hispanic) and the significant risk factor found in the crosstab/chi-square analysis to determine if multiple dimensions of minority status results in greater breast cancer risk. The final step involves using crosstabs and chi-square analysis using the statistically significant three-way interactions to analyze the proportion percentages among sexual orientation and racial categories.

Institutional Review Board Information

Because the BRFSS is listed by the University of Alabama Human Research Protection Program as one of the approved public datasets for secondary data analysis, no IRB approval was needed for this study. A list of approved public datasets can be found on the University of Alabama Institutional Review Board website found at http://osp.ua.edu/site/irb.html. A letter of exclusion is included.

CHAPTER 4

RESULTS

The purpose of this study is to 1) explore demographic differences and commonly identified demographic/non-behavioral and behavioral risk factors by comparing lesbians and heterosexual women, and 2) examine the association/interaction between multiple dimensions of minority status (sexual orientation and race) and statistically significant breast cancer risk factors. Hypotheses were examined individually using chi square analysis, followed by log linear regression analysis of significant associations. Log linear analysis incorporated the variable for *race* and *sexual* orientation in addition to each significant demographic and behavioral risk factor to examine three-way effects of minority status on breast cancer risk factors. Results of breast cancer risk factor variables will be examined to either confirm or refute previous research findings.

The total sample size prior to the exclusion process was 906,120. Once the appropriate inclusion criteria were completed, the remaining sample consisted of 1,544 heterosexual women and 1,538 lesbians. This chapter will consist of a frequency description of the sample, and an explanation of the recoding process, followed by chi-square and loglinear analysis, and ending in a restatement and analysis of the supported/non-supported hypotheses.

Initial BRFSS Population

The initial total sample of 3,082 individuals is organized into demographic and behavioral categories such as sexual orientation, race/ethnicity, age, educational attainment,

employment status, household income, health insurance status alcohol consumption, diet, mammogram use, obesity, physical activity, and tobacco use. The behavioral variables chosen reflect breast cancer risk factors found in the literature and are commonly identified as increasing the risk of a breast cancer diagnosis.

Age is also included. Data pertaining to *age* was obtained by asking respondents their exact age – "What is your age?" Raw data of reported ages of respondents was included in the dataset and recoded into categorical age ranges prior to data analysis. Because of the size of the continuous raw data for age, responses are included in the appendix. A frequency of *age* (M=53.59, SD=16.030) revealed that the average age of respondents was 54 years old, with a standard deviation of 16.030.

Sexual orientation data was obtained in the dataset using the standardized self-identified sexual orientation question – "Do you consider yourself to be:" Response options included straight, lesbian or gay, bisexual, or other. Only two response options of straight and lesbian or gay are included are initial inclusion criteria was met when preparing the dataset for analysis. Out of the total sample population, 50.1% (n=1,544) were heterosexual and 49.9% (n=1,538) were lesbians.

A calculated variable for *race/ethnicity* was used in the dataset that combined responses from two race-related questions, asking respondents to identify their preferred race and a Hispanic only question. Calculated race-ethnicity categories are included in the appendix. Racial categories of White only, non-Hispanic, Black only, non-Hispanic, and Hispanic were included in the dataset after initial inclusion criteria was met. Racial percentages included 2,635 White only, non-Hispanic (85.5%); 276 Black only, non-Hispanic (9.0%), and 171 Hispanic (5.5%) women.

Educational attainment included six levels of academic achievement to answer the question, "What is the highest grade or year of school you completed?" Response options included never attended school or only kindergarten, grades 1-8, grades 9-11, Grade 12 or GED, College 1-3 years, and College 4 years or more. Frequency analysis revealed high percentages of respondents reporting educational achievement at the college level with 43.7% (n=1,347) of respondents achieving 4 or more years of college and 26.1% (n=762) completing 1-3 years. Fewer respondents reported lower levels of academic achievement with 4.3% (n=131) reporting an achievement level of grades 9-11, 1.0% (n=32) of grades 1-8, and .1% (n=3) never attended school or only completed kindergarten.

Employment status contained eight response options to the question, "Are you currently…?" Response options included out of work for less than 1 year, out of work for 1 year or more, a student, a homemaker, self-employed, unable to work, retired, and employed for wages. Out of the total sample population, 47.5% (n=1,457) of respondents reported being employed for wages, followed by 24.9% (n=764) retired, 9.7% (n=296) unable to work, 5.5% (n=170) self-employed, 5.2% (n=161) identified as a homemaker, 3.1% (n=94) reported being a student, and 2.3% (n=71) of respondents were out of work for 1 year or more, leaving 1.8% (n=54) reporting being out of work for less than 1 year.

Household income consisted of eight levels of income ranging from less than $10,000 to more than $75,000. The *household income* question was "is your annual household income from all sources.." Income levels included less than $10,000, less than $15,000, less than $20,000, less than $25,000, less than $35,000, less than $50,000, less than $75,000, and $75,000 or more. Raw data on reported household incomes was not provided in the dataset. Household income included 33.5% (n=899) of respondents reporting an income of $75,000 or more., followed by 15.2%

(n=408) with an income of less than $75,000, 13.9% (n=373) at the less than $50,000 income

level, and 10% (n=269) reporting an income of less than $35,000. The remaining household

income levels revealed that 9.5% (n=255) of respondents reported less than $25,000, followed by

7.3% (n=196) with an income of less than $20,000, 5.9% (n=159) reporting less than $15,000,

and 4.7% (n=125) with an income of less than $10,000.

Health care plan contained two responses to the question, "Do you have any kind of

health care coverage, including health insurance, prepaid plans such as HMOs, government plans

such as Medicare, or Indian Health Service?" Response variables included yes or no. The

majority of respondents (n=2,865, 93.3%) reported having a health care plan, compared to 6.7%

(n=205) without health insurance.

Alcohol consumption was a calculated variable that measured drinking status as a having

a least one alcoholic drink in the last 30 days. Although this variable does not measure alcohol

amount, it allows an examination of the consumption difference between the two populations.

Fifty-four percent of the population (n=1,654) reported drinking at least one alcoholic drink in

the past 30 days compared to 46% (n=1,411) of those who that abstained.

Diet consisted of two calculated variables – fruit intake and vegetable intake. These

variables were only included in the 2015 BRFSS, but were chosen because diet has an effect on

rates of obesity. These two variables measured fruit and vegetable consumption of 1 or more

times or less than one time per day in the last 30 days. Out of the total sample population of

respondents to this question, 63.9% (n=1,061) reported consuming 1 or more fruits daily

compared to 36.1% (n=599) that consumed less than 1 or more fruits daily. When examining

vegetable intake, 79.5% (n=1,309) reported consuming 1 or more vegetables on a daily basis

compared to 20.5% (n=338) that consumed less than 1 or more daily.

Obesity was a calculated variable that used responses to the respondents' weight and height, resulting in a calculated BMI variable. This variable focused on respondents that reported a body weight/height that met BMI standards for being overweight/obese. Response variables in the calculated variables was no (not overweight or obese -underweight/normal weight) and yes (overweight/obese). Out of the total sample population, 58.9% (n=1,816) were calculated as being overweight/obese, leaving 34.1% (n-1,053) calculated as not being overweight or obese.

Mammogram use consisted of two responses, yes or no, to the question, "A mammogram is an x-ray of each breast to look for breast cancer. Have you ever had a mammogram?" This question was included in the mandatory section of the 2014 BRFSS, but was offered as an optional module in 2015. The total number of respondents that responded as having ever had a mammogram was 79% (n=1,142), with 21% (n=304) never having a mammogram.

Physical Activity was measured by asking, "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?" Two response variables of yes or no were given. A large percentage (74.2%) of respondents (n=2,282) reported exercising in the past 30 days, with 795 (25.8%) respondents reporting no exercise.

Tobacco Use was measured using a calculated variable that included two questions, one asking respondents whether respondents smoked 100 cigarettes in their lifetime and for those that answered in the positive, a follow-up question was asked concerning frequency of use. Calculated responses included current smoker, now smokes every day; current smoker, now smokes some days; former smoker; and never smoked. All questions used in this calculated variable are included in the appendix. Reported tobacco use revealed 13.8% (n=425) of respondents identifying as a current smoker, every day, with 5.2% reporting smoking on some

days. Former smokers included 843 (27.5%) of respondents with 53.5% (n=1,644) reporting

never smoking in their lifetime. Characteristics of categorial demographic and behavioral risk

factor variables are shown in the Tables 7 and 8 below.

Table 7: *Distribution of Sample by Demographic Variables, Initial Categorical Variables*

Demographics	Frequency	Percent	Valid Percent
Sexual Orientation			
Heterosexual	1544	50.1	50.1
Lesbian	1538	49.9	49.9
Race/Ethnicity			
White only, non-Hispanic	2635	85.5	85.5
Black only, non-Hispanic	276	9.0	9.0
Hispanic	171	5.5	5.5
Educational Attainment			
College 4 or more years	1347	43.7	43.7
College 1-3 years	805	26.1	26.1
Grade 12 or GED	762	24.7	24.7
Grades 9-11	131	4.3	4.3
Grades 1-8	32	1.0	1.0
Never attended school or only kindergarten	3	.1	.1
Employment Status			
Employed for wages	1457	47.3	47.5
Retired	764	24.8	24.9
Unable to work	296	9.6	9.7
Self-employed	170	5.5	5.5
A homemaker	161	5.2	5.2
A student	94	3.0	3.1
Out of work for 1 year or more	71	2.3	2.3
Out of work for less than 1 year	54	1.8	1.8
Household Income			
Less than 10,000	125	4.1	4.7
Less than 15,000	159	5.2	5.9
Less than 20,000	196	6.4	7.3
Less than 25,000	255	8.3	9.5
Less than 35,000	269	8.7	10.0
Less than 50,000	373	12.1	13.9
Less than 75,000	408	13.2	15.2
75,000 or more	899	29.2	33.5
Health Care Plan			
Yes	2865	93.0	93.3
No	205	6.7	6.7

Table 8: *Distribution of Behavioral Risk Factors for Total Sample*

Behavioral Risk Factor	Frequency	Percent	Valid Percent
Alcohol Consumption			
At least 1 drink in past 30 days	1654	53.7	54.0
No drinks in past 30 days	1411	45.8	46.0
Diet			
Fruit Intake			
1 or more/daily	1061	34.4	63.9
>1 or more daily	599	19.4	36.1
Vegetable Intake			
1 or more daily	1309	42.5	79.5
>1 or more daily	338	11.0	20.5
Mammogram			
Ever had a mammogram	1142	37.1	79.0
Not every had a mammogram	304	9.9	21.0
Physical Activity			
Exercise in the last 30 days	2282	74.0	74.2
Did not exercise	795	25.8	25.8
Tobacco Use			
Current Smoker, Every Day	425	13.8	13.8
Current Smoker, Some Days	159	5.2	5.2
Former Smoker	843	27.4	27.5
Never Smoked	1644	53.3	53.5
Obesity			
Not overweight or obese (underweight or normal weight)	1053	34.2	36.7
Overweight or obese	1816	58.9	63.3

As shown in Table 9 below the most common respondent in each variable was heterosexual, age 80, White only, non-Hispanic, reported having four or more years of college education, was employed, reported a household income of $75,000 or more, lived in Minnesota, and had health insurance.

Table 9: *Description of Most Common Respondent*

Variable	Measure of Central Tendency	Result
Sexual Orientation	Mode	Heterosexual
Age	Mode	80
Race	Mode	White only, non-Hispanic
Education	Mode	College 4 or more years
Employment	Mode	Employed for wages
Household Income	Mode	$75,000+
Resident State	Mode	Minnesota
Health Care Plan	Mode	Has health care plan

Several states and one U.S. territory included the optional, standardized sexual orientation question in their questionnaire. Geographic location is included for informational purposes but is not included in further data analysis. Sample distribution of respondents in each state/territory is shown below in Table 10.

Table 10: *Distribution of Sample by State/Territory*

State/Territory	Heterosexual	Lesbian	Total	Percent (%)	Cumulative Percent (%)
Colorado	50	60	110	3.6	3.6
Connecticut	61	66	127	4.1	7.7
Delaware	33	60	93	3.0	10.7
Georgia	16	17	33	1.1	11.8
Hawaii	23	37	60	1.9	13.7
Idaho	48	25	73	2.4	16.1
Illinois	28	14	42	1.4	17.5
Indiana	87	77	164	5.3	22.8
Iowa	38	18	56	1.8	24.6
Kansas	140	131	271	8.8	33.4
Kentucky	59	29	88	2.9	36.2
Louisiana	39	25	64	2.1	38.3
Maryland	91	116	207	6.7	45.0
Massachusetts	40	65	105	3.4	48.4
Minnesota	150	153	303	9.8	58.3
Missouri	36	36	72	2.3	60.6
Montana	41	16	57	1.8	62.5
Nevada	25	25	50	1.6	64.1
New York	70	94	164	5.3	69.4
Ohio	95	99	194	6.3	75.7
Pennsylvania	84	73	157	5.1	80.8
Texas	50	41	91	3.0	83.7
Vermont	23	69	92	3.0	86.7
Virginia	99	92	191	6.2	92.9
West Virginia	31	16	47	1.5	94.5
Wisconsin	50	61	111	3.6	98.1
Wyoming	36	20	56	1.8	99.9
Guam	1	3	4	.1	100.0
Total	1554	1538	3082		100

Variables Recoded for Analysis

Prior to chi-square and loglinear analyses, I recoded several of the original BRFSS variables. For example, three response categories for the *educational attainment* consisted of academic achievement of less than Grade 12 or GED. Those three response categories were

combined into one. This resulted in an adequate number of respondents in the remaining four categories.

To examine *employment* status, I collapsed seven of the eight response categories resulting in two distinct categories. This created an adequate distribution between the two categories.

To examine, *household* income, I collapsed the eight existing response categories into three categories by combining incomes of less than $25,000 into one category. The remaining five categories were combined creating a range of $25,000 to $49,999, and $50,000 and higher. This improved the distribution among the categories/

Age was coded into categorical variables. As mentioned earlier, the dataset included raw of reported respondent ages. I created six distinct age categories with a range of 10 years with the exception of the first response variable of 18-29 and the last response variable of 70 and older. This change allows a richer analysis of breast cancer risk factors according to age groups.

All missing data and responses such as don't know/not sure or refused found in any of the response variables used in the study were coded prior to the initial analysis as discrete and therefore excluded.

The resulting recoded variables and distributions are shown below in Table 11.

Table 11: *Distribution of Recoded Demographic/Categorical Variables*

Demographics	Frequency	Percent (%)	Valid Percent (%)
Age			
18-29	321	10.4	10.4
30-39	311	10.1	10.1
40-49	458	14.9	14.9
50-59	769	25.0	25.0
60-69	723	23.5	23.5
70 and older	500	16.2	16.2
Educational Attainment			
College 4+ years	1347	43.7	43.7
College 1-3 years	805	26.1	26.1
Grade 12 or GED	762	24.7	24.7
Less than High School	166	5.4	5.4
Employment Status			
Currently Employed	1627	52.8	53.0
Not Employed	1440	46.7	47.0
Household Income			
Less than $25,000	735	23.8	27.4
$25,000-49,999	642	20.8	23.9
$50,000 and more	1307	42.4	48.7

Chi-Square Analyses

Chi-Square analyses were performed to explore the similarities and differences between heterosexual women and lesbians, using demographic and behavioral risk variables from Tables 7, 8, and 11. Out of the duplicate variables in the tables, only those that were recoded were used for the analyses. Analyses found *age, educational attainment, employment status, income, health care plan, alcohol consumption, diet-fruit intake, mammogram use,* and *tobacco use* categorical *v*ariables significantly related to s*exual orientation*.

Age was found to be significantly related to *sexual orientation*, with a significance level of less than .001. Analyses showed that the lesbian sample population included larger numbers of younger respondents. Proportionally more lesbians reported being in the age ranges of 18-29

(67.9%), 30-39 (54.7%), 40-49 (55.9%), and 50-59 (55.3%). Proportionally more heterosexual women reported being in the age ranges of 60-69 (52.7%) and 70 and older (74.6%).

An examination of *race/ethnicity* was not significantly related to *sexual orientation*, with a significance level of .870. There were no significant differences in the distribution of racial categories related to *sexual orientation*. Racial proportions by sexual orientation included 49.7% of lesbians identifying as White only, non-Hispanic; 50.7% as Black only, non-Hispanic, and 51.5% as Hispanic compared to 50.3% of heterosexual women identifying as White only, non-Hispanic, 49.3% as Black only, non-Hispanic, and 48.5% Hispanic.

Educational attainment was significantly related to *sexual orientation*, with a significance level of less than .001. When examining academic achievement at the college level, proportionally more lesbians (59.5%) reported completing 4 or more years of college compared to 40.5% of heterosexual women. Proportionally more heterosexual women reported academic levels of 1-3 years of college (52.9%) compared to 47.1% of lesbians. Heterosexual women also had proportionally higher rates of lower academic achievement with 62.7% reporting completing grade 12 or GED compared to 37.3% of lesbians, leaving 56% of heterosexual women with less than a high school education compared to 44% of lesbians.

Employment status was significantly related to *sexual orientation,* with a level of significance less than .001. Proportionally more lesbians (56%) reported being employed compared to 44% of heterosexual women. Proportionally more heterosexual women (56.9%) reported being unemployed compared to 43.1% of lesbians.

Household income was found to be significantly related to s*exual orientation*, with a significance level of .024. Proportionally more lesbians (54.6%) reported an income of $50,000 or more compared to 45.4% of heterosexual women.

The *health care plan* variable was found to be significantly related to *sexual orientation* at a statistical level of .005. Proportionally more lesbians reported not having insurance (59.5%) compared to 50.7% of heterosexual women with insurance.

Data analyses for these demographic variables are reflected below in Table 12.

Table 12: *Chi-Square Analyses of Demographic/Non-Behavioral Variables*

Demographics	Heterosexual Frequency (%)	Lesbian Frequency (%)	Chi-Square *p*
Age			**<.001****
18-29	103 (32.1)	218 (67.9)	
30-39	141 (45.3)	170 (54.7)	
40-49	202 (44.1)	256 (55.9)	
50-59	344 (44.7)	425 (55.3)	
60-69	381 (52.7)	342 (47.3)	
70 and older	373 (74.6)	127 (25.4)	
Race/Ethnicity			.870
White only, non-Hispanic	1325 (50.3)	1310 (49.7)	
Black only, non-Hispanic	136 (49.3)	140 (50.7)	
Hispanic	83 (48.5)	88 (51.5)	
Educational Attainment			**<.001****
College 4+ years	546 (40.5)	801 (59.5)	
College 1-3 years	426 (52.9)	379 (47.1)	
Grade 12 or GED	478 (62.7)	284 (37.3)	
Less than High School	93 (56.0)	73 (44.0)	
Employment Status			**<.001****
Currently Employed	716 (44.0)	911 (56.0)	
Not Employed	819 (56.9)	621 (43.1)	
Household Income			**.024***
Less than $25,000	363 (49.4)	372 (50.6)	
$25,000-49,999	331 (51.6)	311 (48.4)	
$50,000 and more	593 (45.4)	714 (54.6)	
Health Care Plan		.	**.005***
Yes	1453 (50.7)	1412 (49.3)	
No	83 (40.5)	122 (59.5)	

Note: *p<.05, **p=<.001

Alcohol consumption was significantly related to *sexual orientation* at the significance level of less than .001. Analyses revealed proportionally more lesbians (56.7%) reported

consuming at least one alcoholic drink in the past 30 days with 58% of heterosexual women reporting with no alcohol consumption.

Analyses of *diet* revealed a significant relationship to *sexual orientation,* at the significance level of .011 for fruit intake. Proportionally more lesbians (53.8%) reported less than 1 serving or more of fruit daily in the last 30 days. Vegetable intake was not significantly related to *sexual orientation*, with a significance level of .099. Reported rates of vegetable intake was not statistically different between heterosexual women and lesbians.

Mammogram use was found to be significantly related to *sexual orientation* at a significance level of less than .001. Proportionally more lesbians (60.9%) reported not having a mammogram, compared to 51.8% of heterosexual women who reported having a mammogram in their lifetime.

Physical activity was not significantly related to *sexual orientation*, with a significance level of .075. Similar portions existed for activity and non-activity.

Tobacco use was significantly related to s*exual orientation*, with a significance level of less than .001. Lesbians reported proportionally higher rates of tobacco use daily (61.6%) and some days (60.4%). There was also a proportionally higher rate of lesbians (55%) that reported being former smokers. Finally, heterosexual women (56.8%) reported never smoking in their lifetime compared to 43.2% of the lesbian population.

Obesity was not statistically significant with a significance level of .342. A large number of the total sample in general was calculated as being overweight Proportionally more lesbians were overweight/obese (52%) compared to heterosexual women (48%). Overall, the distribution between being overweight/obese or not between the heterosexual and lesbian population was similar. Chi-square analyses of behavioral risk factors are shown below in Table 13.

Table 13: *Chi-Square Analyses of Behavioral Risk Factors*

Behavioral Risk Factor	Heterosexual Frequency (%)	Lesbian Frequency (%)	Chi-Square p
Alcohol Consumption			**<.001****
1 drink in past 30 days	716 (43.3)	938 (56.7)	
No drinks in past 30 days	819 (58.0)	592 (42.0)	
Diet			.
Fruit Intake			**.011***
1 or more/daily	560 (52.8)	501 (47.2)	
>1 or more daily	277 (46.2)	322 (53.8)	
Vegetable Intake			.099
1 or more daily	670 (51.2)	639 (48.8)	
>1 or more daily	156 (46.2)	182 (53.8)	
Mammogram			**<.001****
Ever had a mammogram	591 (51.8)	551 (48.2)	
No mammogram	119 (39.1)	185 (60.9)	
Physical Activity			.075
Exercise in the last 30 days	1122 (49.2)	1160 (50.8)	
Did not exercise	420 (52.8)	375 (47.2)	
Tobacco Use			**<.001****
Current Smoker, Every Day	163 (38.4)	262 (61.6)	
Current Smoker, Some Days	63 (39.6)	96 (60.4)	
Former Smoker	379 (45.0)	464 (55.0)	
Never Smoked	933 (56.8)	711 (43.2)	
Obesity			.342
Not overweight or obese(underweight/normal weight)	525 (49.9)	528 (50.1)	
Overweight/obese	872 (48.0)	944 (52.0)	

Note: $*p<.05$, $**p<.001$

Loglinear Analyses

The loglinear analysis method was used to examine three-way relationships/associations among and between categorical variables, specifically *sexual orientation, race/ethnicity*, and the significant chi-square findings related to *sexual orientation*. The analysis also explored two-way (partial) interactions among the three chosen variables. The introduction of an additional minority status in analysis was used to explore if the introduction of *race/ethnicity* influenced breast cancer risks, especially when analyzing behavioral and non-behavioral risk factors. *Diet*

(vegetable intake), physical activity, and *obesity* were not analyzed using loglinear analysis because these variables were not found to be statistically significant in the previous chi-square analyses. Significant findings reported below that show two-way interactions between race and other categorical variables will not be further explored due to *sexual orientation* being the focus of the study.

Loglinear analysis found no three-way association/relationship between the variables *sexual orientation, race/ethnicity*, and *age,* with a significance level of .383. Partial two-way statistical associations were found between s*exual orientation* and *age* with a significance level of less than .001. This confirmed previous chi-square findings showing the statistically significant differences within age range when examining sexual orientation without race. There is also a partial two-way statistical significance between *race/ethnicity* and *age* with a significance level of less than .001.

A significant three-way association was found between *sexual orientation, race/ethnicity*, and *educational attainment* with a significance level of .005. A partial two-way significant association was found between *sexual orientation* and *educational attainment* that confirmed previous findings. Introducing r*ace/ethnicity* revealed significant proportional differences of *educational attainment* along racial lines. When examining the highest earned educational status in each group, heterosexual, White only, non-Hispanic women (37.1%) reported completed four or more years of college, while 34.6% of Black only, non-Hispanic, heterosexual women achieved college of 1-3 years. Within the heterosexual Hispanic group, proportionally more Hispanics reported completing high school or receiving a GED (33.7%) out of other levels of educational attainment. In the lesbian population, the highest grade achievement remained consistent for lesbian White only, non-Hispanic (56.5%) and lesbian Black only, non-Hispanic

(41.4%) achieving four or more years of college, but 36.4% of lesbian Hispanic women reported achieving college of 1-3 years. There are not clear patterns in other educational attainment levels for both heterosexual and lesbian women among racial categories. The analysis did report a significant partial two-way association between *race* and *educational attainment* with a significance level of less than .001.

There was no significant association between *sexual orientation, race/ethnicity,* and *employment status*. A partial two-way significant association was found between *sexual orientation* and *employment status* with a significance level of less than .001. This confirms previous chi-square findings reporting that lesbians have higher rates of employment compared to heterosexual women. Higher rates of employment remained were examined showing that heterosexual whites (54.2%) were more likely to be unemployed, but lesbian minorities were more likely to be employed.

A statistically significant relationship/association was not found between *sexual orientation, race/ethnicity,* and *household income* with a significance level of .722. There was a partial two-way significant relationship/association between s*exual orientation* and *household income* with a significance level of .027. This confirmed previous chi-square showing that lesbians earned a proportionally higher household incomes. Loglinear analysis showed that patterns of income are similar in each ethnic group, with heterosexual White only, non-Hispanic and lesbian White only, non-Hispanic reporting proportionally higher rates of income of $50,000 or more compared to sexual minorities. A partial two-way significant association/relationship was also found between *race* and *household income.*

A statistically significant association/relationship was found when analyzing s*exual orientation, race/ethnicity*, and having a *health care plan* with a significance level of .040.

Previous chi-square analysis found that proportionally more heterosexual women had health care insurance compared to lesbians. Loglinear analysis showed differences in rates of not having health insurance with 3.9% of heterosexual White only, non-Hispanic women not having insurance, 9.6% of heterosexual Black only, non-Hispanic women, and 22.9% of heterosexual Hispanic women. Similar trends were found within the lesbian racial populations. Among White only, non-Hispanic lesbians, 6.7% reported not having insurance, with 15.7% of Black only, non-Hispanic lesbians, and 15.1% of lesbian Hispanics also not having insurance.

Loglinear data analyses for these demographic/non-behavioral variables are reflected below in Table 14.

Table 14: *Loglinear Analyses of Demographic/Non-Behavioral Variables*

Variable	Hetero. (W) (%)	Hetero. (B) (%)	Hetero. (H) (%)	Lesbian (W) (%)	Lesbian (B) (%)	Lesbian (H) (%)	Loglinear *p*
Age							
18-29	5.2	12.5	20.5	12.2	21.4	31.8	
30-39	7.7	11.8	27.7	9.3	20.7	21.6	
40-49	11.9	17.6	24.1	15.5	24.3	21.6	
50-59	22.2	27.9	14.5	29.2	18.6	18.2	
60-69	26.5	16.9	8.4	24.5	10.7	6.8	
70 and older	26.5	13.2	4.8	9.2	4.3	0.0	
SO*Race*Age							.383
SO*Race							.116
SO*Age							**<.001****
Race*Age							**<.001****
Educational Attainment							
College 4+	37.1	24.3	26.5	56.5	41.4	20.5	
College 1-3	27.2	34.6	22.9	23.5	27.9	36.4	
Grade 12/GED	31.0	28.7	33.7	16.8	31.4	22.7	
Less than High School	4.7	12.5	16.9	3.2	9.3	20.5	
SO*Race*EA							**.005***
SO*Race							.160
SO*EA							**<.001****
Race*EA							**<.001****
Employment Status							
Currently Employed	45.8	48.5	57.8	59.4	58.7	62.1	
Not Employed	54.2	51.5	42.2	40.6	41.3	37.9	
SO*Race*ES							.464
SO*ES							**<.001****
SO*Race							.965
Race*ES							.171
Household Income							
< $25,000	25.7	39.5	46.6	24.0	42.6	40.8	
$25,000-49,999	25.7	29.0	20.5	21.8	24.0	26.3	
$50,000 +	48.6	31.5	32.9	54.2	33.3	32.9	
SO*Race*HI							.722
SO*Race							.986
SO*HI							**.027***
Race*HI							**<.001****
Health Care Plan							
Yes	96.1	90.4	77.1	93.3	84.3	84.9	
No	3.9	9.6	22.9	6.7	15.7	15.1	
SO*Race*HCP							**.040***
SO*Race							.995
SO*HCP							**.005***
Race*HCP							**<.001****

Note: *p<.05, **p<.001; SO=sexual orientation, W=White only, non-Hispanic, B=Black only, non-Hispanic, H=Hispanic; EA=Educational Attainment, ES=Employment Status, HI=Household Income; HCP=Health Care Plan.

An examination of the three-way association/relationship of *sexual orientation, race/ethnicity*, and *alcohol consumption* found no significance with a significance level of .988. Although the introduction of *race/ethnicity* was not significant, the *sexual* orientation effect confirmed by the previous chi-square analysis of a higher proportion of alcohol consumption was shown to be consistent across all racial samples, with higher reported rates of non-drinking among heterosexual racial categories, and higher rates of reported drinking 1 drink in the past month in all lesbian racial categories. A partial two-way significant association/relationship was also found between *race* and *alcohol consumption* with a significance level of .037.

An analysis of the three-way association of s*exual orientation, race/ethnicity* and *diet (fruit intake)* was found not significant with a significance level of .054. There was a significant two-way association between s*exual orientation* and *diet (fruit intake)* with a significance level of .010, which was confirmed by previous chi-square analysis. Loglinear analysis showed proportionally higher rates of eating less than 1 fruit a day in heterosexual Black only, non-Hispanic women and lesbian Hispanic women.

Examination of a three-way association of *sexual orientation, race/ethnicity,* and *mammogram use* was found not statistically significant with a significance level of .717. Although not significant, the *sexual orientation* effect of fewer mammograms confirmed by the previous chi-square analysis was found across racial lines. Not surprisingly a two-way association was revealed among *sexual orientation* and mammogram. Loglinear analysis examining within group rates of mammogram use shows trends of racial differences and *mammogram use*, with rates of not having a mammogram increasing within each racial category. For example, 15.1% of White only, non-Hispanic heterosexual women reported not having a mammogram, while 19.7% of Black only, non-Hispanic heterosexual, and 41.2% of heterosexual

Hispanic women reported non-use. In the lesbian sample, 23.9% of White only, non-Hispanic lesbians reported not having a mammogram, while 26.5% of Black only, non-Hispanic lesbians, and 45.7% of Hispanic lesbians reported non-use. There was also a significant two-way association when examining *race* and *mammogram use* with a significance level of less than .001.

There was no significant association when examining *sexual orientation, race,* and *tobacco use* with a significance level of .838. Although the introduction of *race/ethnicity* was not significant, the *sexual orientation* effect of lesbians having proportionally higher rates of *tobacco use* for every day and somedays in the previous chi-square analysis was consistent across the three racial groups. Not surprisingly, a partial two-way significant association between *sexual orientation* and *tobacco use* was confirmed by a previous chi-square analysis. There was also a significant two-way association when examining *race* and *tobacco use* with a significance level of less than .001.

Loglinear data analyses for these behavioral variables are reflected below in Table 15.

Table 15: *Loglinear Analyses of Behavioral Risk Factor Variables*

Variable	Hetero. (W) (%)	Hetero. (B) (%)	Hetero. (H) (%)	Lesbian (W) (%)	Lesbian (B) (%)	Lesbian (H) (%)	Loglinear *p*
Alcohol Consumption							
1 drink/30 days	47.5	39.8	43.4	62.2	54.3	59.3	
No drinks/30 days	52.5	60.2	56.6	37.8	45.7	40.7	
SO*Race*AC							.988
SO*Race							.719
SO*AC							**<.001****
Race*AC							**.037***
Diet							
Fruit Intake							
1 or more/daily	67.5	57.1	74.0	60.7	66.7	55.4	
>1 or more daily	32.5	42.9	26.0	39.3	33.3	44.6	
SO*Race*FI							.054
SO*Race							.749
SO*FI							**.010***
Race*FI							.836
Mammogram							
Ever had a mammogram	84.9	80.3	58.8	76.1	73.5	54.3	
No mammogram	15.1	19.7	41.2	23.9	26.5	45.7	
SO*Race*MU							.717
SO*Race							.827
SO*MU							**<.001****
Race*MU							**<.001****
Tobacco Use							
Current Smoker, Every Day	10.8	12.6	4.8	17.1	19.6	13.6	
Current Smoker, Some Days	3.9	5.2	6.0	5.5	10.1	11.4	
Former Smoker	25.8	19.3	14.5	32.4	18.1	17.0	
Never Smoked	59,5	63.0	74.7	45.0	52.2	58.0	
SO*Race*TU							.838
SO*Race							.652
SO*TU							**<.001****
Race*TU							**<.001****

Note: *p<.05, **p<.001; SO=sexual orientation, W=White only, non-Hispanic, B=Black only, non-Hispanic, H=Hispanic; AC=Alcohol Consumption, FI=Fruit Intake, MU=Mammogram Use; TU=Tobacco Use.

Summary of Findings by Hypothesis

Hypothesis 1.

Lesbians will have higher rates of demographic and behavioral risk factors for breast cancer compared to heterosexual women.

This hypothesis was partially supported. The sample population consistently largely of white women. Discussed earlier, white women have the higher breast cancer incidence rates compared to other races. White heterosexual women comprised 49.7% of the sample population compared to 49.7% of white lesbians. Lesbians also reported higher educational attainment and higher rates of household income. Regardless of sexual orientation, studies show that women with higher incomes and higher educational status may be at more risk of breast cancer risk due to increased alcohol use (Heck & Pamuck, 1997; Krieger, 1990; Laden et al., 1997).

Examining behavioral risks, the proportion of alcohol consumption was higher in lesbians. Almost 57% reported drinking alcohol in the past 30 days compared to heterosexual women (43.3%). This supports previous studies of proportionally higher rates of alcohol consumption in the lesbian population (Austin et al., 2012; Case et al., 2004). Tobacco use by lesbians was also proportionally higher and confirms previous research findings (Case et al., 2004; Cochran et al., 2001; Valanis et al., 2000). Over 61% of lesbians compared to 38.4% of heterosexual women reported smoking daily. Additionally, reports of smoking on some days were also proportionally higher in the lesbian population (60.4%) compared to heterosexual women (39.6%). This may indicate smoking on a more social level rather than habitual. Rates of smoking history could also pose a risk because it is not clear of the timeframe of smoking cessation. Some reports could be recent and involve previous heavy smoking.

Higher rates of obesity have been reported by previous research, but there were no significant differences between the sample population in this study (Dibble, Roberts, & Nussey, 2004; Roberts et al., 1998; Valanis et al., 2000; Zaritsky & Dibble, 2010).

Additionally, fewer lesbians reported having a mammogram (60.9%) in their lifetimes compared to 39.1% of heterosexual women. This is confirmed by previous research that shows

a lowers rates of mammogram use by lesbians (Hart & Bowen, 2009). Lower rates of having a health care plan also puts lesbian at a risk because due to non-coverage, they may not be following breast cancer prevention recommendations.

The hypothesis does not support findings on physical activity and obesity. According to the analysis, lesbians (50.8%) reported exercising in the last 30 days at a higher rate than heterosexual women (49.2%) which is supported by previous research (Case et al., 2004). This reflected lower rates of inactivity in lesbians (47.2%) compared to heterosexual women (52.8%).

Hypothesis 2:

The intersection of sexual orientation and race will be associated with the risks of a breast cancer diagnosis.

This hypothesis was partially supported. Most behavioral risk factors related to breast cancer risk, such as alcohol and tobacco use, diet (fruit intake), and mammogram use were not influenced by the introduction of race. Differential levels in the variables found by the chi-square analysis were not significantly changed, showing no intersecting effect. That doesn't mean racial differences in risk do not exist, but rather sexual orientation was the main influence rather than race. Only two variables were influenced by race- having a health care plan and educational attainment. Analysis showed the highest rates of lack of health insurance coverage among Hispanic heterosexual women (22.9%), Black only, non-Hispanic lesbians (15.7%), and Hispanic lesbians (15.1%). Analysis of educational attainment showed how academic achievement varies along racial lines. Rates of lower academic achievement were more evident. For example, the findings showed that 20.5% of Hispanic lesbians and 16.9% of Hispanic lesbians earned less than a high school diploma. Variations in race were found at the high school

level with 28% of Black only, non-Hispanic heterosexual women and 31.4% of Black only, non-Hispanic lesbians graduating high school.

CHAPTER 5

DISCUSSION

Overview

This chapter will discuss the results of the data analysis, including limitations, directions for future research, and implications for social work practice, policy, and research. The findings of this study suggest that sexual minority status might influence differential levels of breast cancer risk factors, such as alcohol consumption, tobacco use, diet, mammogram use, rates of obesity, and having health insurance coverage. Lesbians were more likely to report higher rates of alcohol consumption and tobacco use, lower rates of fruit and vegetable intake, lower rates of mammogram use, higher rates of obesity, and lower rates of having health care insurance. However, lesbians differed in rates of physical activity with lesbians reporting higher rates compared to heterosexual women.

Characteristics of the sample population

The total sample population consisted of 3,082 individuals in three distinct racial categories, White, African American, and Hispanic. With the selection of a 1% random sample of the heterosexual female population, the sample size of lesbians compared to heterosexual women were close in number with 1,544 heterosexual women, and 1,538 lesbians. Racially, the study consisted of predominantly white women (85.5%), who were highly educated with high incomes. When examining the demographic differences between heterosexual women and lesbians, it was observed that lesbians generally had higher incomes, were more educated, had

higher rates of employment, but lower rates of having health insurance. There were no significant differences in the distribution of racial groups.

Findings on Breast Cancer Risk Factors

There were several findings that confirmed previous research findings related to higher differential levels of breast cancer risk factors in the lesbian population. For instance, proportionally higher rates of alcohol consumption were reported by lesbians regardless of race. Increased alcohol consumption is a consistent finding in the research (Austin et al., 2012; Case et al., 2004). Although this was found to be significant when comparing the two populations, the question of alcohol consumption only focused on consuming one drink in the past 30 days. This does not necessarily indicate a higher alcohol consumption pattern. It is possible that this is more indicative of social drinking as compared to habitual drinking. Levels of alcohol intake and frequency must be further explored to confirm this finding.

Diet, fruit and vegetable intake, along with higher rates of being overweight/obese also implied a possible higher breast cancer risk for lesbians. In this study, more lesbians appeared to not follow recommended daily nutrition guidelines by eating less fruits compared to heterosexual women, which may be related to higher rates of being overweight/obese among lesbians discussed earlier. This is a concern since obesity may increase breast cancer risk, especially in postmenopausal women (ACS, 2015). Few studies have examined the dietary habits of lesbians. This confirms a previous study that found differences in healthy diet habits between lesbians and heterosexual women (Valanis et al., 2000). Overall, dietary habits of the general US population may be poor due to the high rates of obesity. Statistics show that more than 35% of US adults are obese (CDC, 2017c).

There was no significant difference in the rates of physical activity between heterosexual women and lesbians. Physical activity has been shown to be a protective factor by reducing breast cancer risk when exercising on a regular basis, especially in post- menopausal 0omen ((McTiernan et al., 2003; Wu, Zhang, & Kang, 2013; Eliassen, Hankinson, Rosner, Holmes, & Willett, 2010; Fournier et al., 2014). The results of this study may not accurately reflect physical activity because frequency and intensity are not known. It is possible that exercising in the last 30 days may not reflect a dedicated exercise routine on a consistent basis.

Mammogram use was also reported at a significantly lower rate than heterosexual women. Previous studies show lower mammogram use in the lesbian population (Cochran et al., 2001; Kerker, Mostashari, & Thorpe, 2006). This might be explained by variations in income, employment, and fewer lesbians reporting health insurance compared to heterosexual women. Poor interactions with medical providers can also have an effect on mammogram use. DeHart (2008) found a correlation between lesbians' perception of heterosexism and homophobia, utilization of breast exams, and visits to primary care and gynecological care providers. These perceptions can be enforced by not having a welcoming environment and the lack of direct and open communication between a lesbian patient and the physician. These negative experiences or the fear of a negative experience has resulted in some lesbians delaying or avoiding medical care, especially preventative healthcare treatments (Barbara, Quandt, & Anderson, 2001).

Results regarding mammogram use must be taken with caution for two reasons. First, the sample size was decreased because mammogram use was included in the core section of the 2014 BRFSS, but was optional in 2015 so there may be individuals in the total sample that had mammograms that were not a part of the analysis. Also, the lesbian population had higher rates

of respondents younger than 40, which is the starting age at which mammogram use is recommended. This could affect the accuracy of the level of significance of non-use.

Tobacco use is another behavioral factor consistently found to be used at a higher rate in the lesbian population (Case et al., 2004; Cochran et al., 2001; Valanis, Bowen, Bassford, Whitlock, Charney, & Carter, 2000). Although the link to breast cancer is debated, a history of heavy smoking may increase risk (ACS, 2015). Lesbians in this study were found to have higher rates of tobacco use compared to heterosexual women, regardless of race. A large number of lesbians who did not smoke or were former smokers which may indicate that lesbians are modifying their risk behaviors.

Rates of not having health insurance was also higher in the lesbian population. This could be explained by a portion of the lesbian population with less academic achievement, lower rates of income, and reported rates of unemployment. This is a concern because the lack of health insurance and access to quality healthcare may result in some lesbians receiving a late stage breast cancer diagnosis due to the inability to receive preventative mammogram screenings.

When introducing race/ethnicity with sexual orientation, little significance was found. Although race did affect educational attainment and rates of health insurance, the main effect was sexual orientation. Overall, these findings show the importance of creating interventions that are sensitive to sexual orientation and tailored to targeted to the population.

Strengths and Limitations

The main strength of this study is the use of a standardized sexual orientation question. Interpreting results using varying behavioral descriptions of sexuality can result in the inclusion of individuals that may be behaviorally categorized as a lesbian, but not self-identify as lesbian. Since stigma may result in a presentation of increased behavioral risks, gathering a true picture

of the health risks, especially breast cancer risks of the lesbian population are best served by a standardized sexual orientation question. Also, the sample of respondents, although a modest size, was more diverse geographically than many breast cancer research studies with the lesbian population. Furthermore, breast cancer risk findings were consistent with previous studies, which may lead to lesbians having a more visible presence in future research.

There are several limitations in this study. First, obesity was not found to be significant, but prior studies show significant differences in obesity rates between lesbians and heterosexual women. Differences in body image in the lesbians in general and in heterosexual/lesbian African Americans and Hispanic populations may have introduced response bias regarding obesity rates. Second, selection bias may have resulted from the use of the BRFSS and selection criteria of the sample population. The BRFSS excludes individuals in institutions, which doesn't include others who are in medical and long-term care facilities, and incarcerated. Also, two years were selected for analysis. It is possible that the respondents included may be different from the rest of the population. Also, the 1% random sample of heterosexual women may be also different from those in the total sample that answered the sexual orientation question, especially in responses to behavioral risk factors. Third, stigma may have resulted in an underreporting of sexual orientation in general, but may be more prevalent in different age groups. For example, older lesbians may be more reluctant to self-identify due to the historical mistreatment of sexual minorities in society. According to Fredrikson-Goldsen and Kim (2015), lesbians age 65 and older are more likely to answer "don't know/not sure" or refuse to answer questions about sexual orientation. Fourth, analyzing certain behaviors more closely would give richer information as to the health behaviors of lesbians. Certain levels of measurement used in this study, specifically for physical activity and alcohol consumption, may not accurately reflect health behaviors and

breast cancer risk. Duration and intensity of physical activity and frequency and amount of alcohol intake would need to be examined more in-depth in future studies. Fifth, the inclusion of respondents younger than 40 could have resulted in significant findings that were not present. Women younger than 40 likely answered that they had never had a mammogram which would not be indicative of non-use of age—related breast cancer prevention guidelines.

Lastly, generalizability is limited due to sexual orientation being an optional question. Only 27 states and one U.S. territory were included and is therefore not generalizable to the remaining lesbian population in the U.S. Although this study had a modest number of lesbians, more sexual minority women may have been included if sexual orientation was present in the core section of the BRFSS.

Implications and Future Directions

This research is relevant to social work practice, policy, and social work public health research. The findings of breast cancer risks in the lesbian population has direct implications to social work in all three areas.

Social Work Practice, Policy, and Research

Social work practice can play a vital role in addressing breast cancer risks in the lesbian population. Traditionally social work practice uses a holistic approach, to examine not only an individual's needs, but also the effects of influences such as stigma that are systemic that may affect the client. This is especially important when working with the lesbian population. Social workers are equipped to assist lesbians, using a gay-affirmative perspective, that would create a more welcoming environment. This could strengthen the client-provider relationship, resulting in removing barriers to self-identification, especially for those lesbians that would be hesitant to disclose their sexuality.

Social workers could also use these findings to address increased breast cancer risk and create culturally-specific interventions on an individual and community level that focuses on modifying at risk behaviors. Health education programs could be created for lesbians that emphasize prevention of breast cancer, that include information about mammogram screening recommendations and lifestyle modifications, such as tobacco cessation, healthy diet habits.

Social workers can use these findings to advocate for changes in public health promotion policies to ensure inclusion of breast health information targeted to the lesbian population. On a state and national level, social workers can also advocate for policy changes regarding the inclusion of sexual orientation in health-related surveys and cancer registries that could result in gathering useful statistical information not only about at-risk behaviors, but also breast cancer incidence and mortality rates in the lesbian population.

These results could serve as another piece of the puzzle in confirming the results of previous studies and positions of thought on breast cancer risk in the lesbian population. Social workers could use this information and expand on its findings and create effective and focused breast health interventions tailored to the target population on micro, mezzo, and macro levels, and influence policy changes nationwide.

Because breast cancer research with the lesbian population is limited, social workers also have opportunities to make significant contributions to the literature. Although research challenges with this population exists, these findings could be explored further with more emphasis on breast cancer risk among racial minority lesbians.

This dissertation provided supporting evidence of breast cancer risks in the lesbian population. This serves as evidence of the need for continued research and health promotion interventions to modify behavioral risks to improve health outcomes of the lesbian population.

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RAW DATA FOR AGE OF RESPONDENTS

IMPUTED AGE VALUE COLLAPSED ABOVE 80

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18	20	.6	.6	.6
	19	26	.8	.8	1.5
	20	23	.7	.7	2.2
	21	29	.9	.9	3.2
	22	32	1.0	1.0	4.2
	23	22	.7	.7	4.9
	24	28	.9	.9	5.8
	25	29	.9	.9	6.8
	26	34	1.1	1.1	7.9
	27	21	.7	.7	8.6
	28	30	1.0	1.0	9.5
	29	27	.9	.9	10.4
	30	34	1.1	1.1	11.5
	31	30	1.0	1.0	12.5
	32	27	.9	.9	13.4
	33	28	.9	.9	14.3
	34	33	1.1	1.1	15.3
	35	34	1.1	1.1	16.5
	36	35	1.1	1.1	17.6
	37	37	1.2	1.2	18.8
	38	32	1.0	1.0	19.8
	39	21	.7	.7	20.5
	40	38	1.2	1.2	21.7
	41	37	1.2	1.2	22.9
	42	47	1.5	1.5	24.5
	43	38	1.2	1.2	25.7
	44	45	1.5	1.5	27.2

45	43	1.4	1.4	28.6
46	40	1.3	1.3	29.9
47	46	1.5	1.5	31.3
48	55	1.8	1.8	33.1
49	69	2.2	2.2	35.4
50	67	2.2	2.2	37.5
51	58	1.9	1.9	39.4
52	83	2.7	2.7	42.1
53	85	2.8	2.8	44.9
54	102	3.3	3.3	48.2
55	80	2.6	2.6	50.8
56	67	2.2	2.2	53.0
57	64	2.1	2.1	55.0
58	91	3.0	3.0	58.0
59	72	2.3	2.3	60.3
60	80	2.6	2.6	62.9
61	75	2.4	2.4	65.3
62	80	2.6	2.6	67.9
63	82	2.7	2.7	70.6
64	81	2.6	2.6	73.2
65	77	2.5	2.5	75.7
66	68	2.2	2.2	77.9
67	65	2.1	2.1	80.0
68	64	2.1	2.1	82.1
69	51	1.7	1.7	83.8
70	51	1.7	1.7	85.4
71	38	1.2	1.2	86.7
72	41	1.3	1.3	88.0
73	35	1.1	1.1	89.1
74	40	1.3	1.3	90.4
75	29	.9	.9	91.4
76	30	1.0	1.0	92.3
77	33	1.1	1.1	93.4
78	28	.9	.9	94.3
79	21	.7	.7	95.0
80	154	5.0	5.0	100.0
Total	3082	100.0	100.0	

BRFSS Questionnaire: *Health Care Access*

Domain	Question	Response	
Health Care Access	3.1 Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, government plans such as Medicare, or Indian Health Service?	1 2 7 9	Yes No Don't know / Not sure Refused

BRFSS Questionnaire: *Demographics*

Domain	Questions	Responses	
Demographics	Indicate sex of respondent. Ask only if necessary.	1 2	Male Female
	What is your age	_ _ 0 7 0 9	Code age in years Don't know / Not sure Refused
	Race/Ethnicity calculated	1 2 3 Native, non-Hispanic 4 5 Hispanic 6 7 8 9	White only, non-Hispanic Black only, non-Hispanic American Indian or Alaskan Asian only, non-Hispanic Native Hawaiian, non- Other race only, non-Hispanic Multiracial, non-Hispanic Hispanic Don't know/Not Sure

What is the highest grade or year of school you completed?	1 Never attended school or only attended kindergarten 2 Grades 1 through 8 (Elementary) 3 Grades 9 through 11 (Some high school) 4 Grade 12 or GED (High school graduate) 5 College 1 year to 3 years (Some college or technical school) 6 College 4 years or more (College graduate)
Are you currently…?	1 Employed for wages 2 Self-employed 3 Out of work for 1 year or more 4 Out of work for less than 1 year 5 A Homemaker 6 A Student 7 Retired 8 Unable to work: 9 Refused
Is your annual household income from all sources	1 Less than $25,000 ($20,000 to less than $25,000) 2 Less than $20,000 ($15,000 to less than $20,000) 3 Less than $15,000 ($10,000 to less than $15,000) 4 Less than $10,000 5 Less than $35,000 ($25,000 to less than $35,000) 6 Less than $50,000 ($35,000 to less than $50,000) 7 Less than $75,000

		($50,000 to less than $75,000)
		8 $75,000 or more:
		7 7 Don't know / Not sure
		9 9 Refused
About how much do you weigh without shoes?		_ _ _ _ Weight (pounds/kilograms)
		7 7 7 7 Don't know / Not sure
		9 9 9 9 Refused
About how tall are you without shoes?		_ _ / _ _ Height (f t / inches/meters/centimeters)
		7 7/ 7 7 Don't know / Not sure
		9 9/ 9 9 Refused
Adults who have a body mass greater than 25.00 (overweight/obese)		1 No 2 Yes

BRFSS Questionnaire: *Tobacco Use*

Domain	Questions	Responses
Tobacco Use	Have you smoked at least 100 cigarettes in your entire life? NOTE: 5 packs = 100 cigarettes	1 Yes 2 No 7 Don't know / Not sure 9 Refused
	Do you now smoke cigarettes every day, some days, or not at all?	1 Every day 2 Some days 3 Not at all 7 Don't know / Not sure 9 Refused
	Four-level smoker status. Every day smoker, someday smoker, former smoker, non-smoker	1 Current smoker, Every day 2 Current smoker, Some days 3 Former smoker 4 Never smoked 9 Don't know/Refused

BRFSS Questionnaire: *Alcohol Consumption*

Domain	Questions	Responses	
Alcohol Consumption	During the past 30 days, how many days per week or per month did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor?	1 _ _ 2 _ _ 7 7 7 8 8 8 No drinks in past 30 days 9 9 9	Days per week Don't know / Not sure Days in past 30 days Refused
	One drink is equivalent to a 12-ounce beer, a 5-ounce glass of wine, or a drink with one shot of liquor. During the past 30 days, on the days when you drank, about how many drinks did you drink on the average? NOTE: A 40 ounce beer would count as 3 drinks, or a cocktail drink with 2 shots would count as 2 drinks.	_ _ 7 7 9 9	Number of drinks Don't know / Not sure Refused
Calculated Variable	Adults who reported having one drink of alcohol in the past 30 days.	1 2 7 9	Yes No Don't know/Not sure Refused/Missing

BRFSS Questionnaire: *Fruits and Vegetables*

Domain	Questions	Responses	
Fruits and Vegetables	During the past month, not counting juice, how many times per day, week, or month did you eat fruit? Count fresh, frozen, or canned fruit.	1 _ _ 2 _ _ 3 _ _ 5 5 5 7 7 7 9 9 9	Per day Per week Per month Never Don't know / Not sure Refused

BRFSS Questionnaire*: Exercise (Physical Activity)*

Domain	Questions	Responses		
	During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?	11.1	1	Yes
			2	No
			7	Don't know / Not sure
			9	Refused

BRFSS Questionnaire: *Breast and Cervical Cancer Screening*

Domain	Questions	Responses	
Breast and Cervical Cancer Screening	A mammogram is an x-ray of each breast to look for breast cancer. Have you ever had a mammogram?	1	Yes
		2	No
		7	Don't know / Not sure
		9	Refused

BRFSS Questionnaire: *Sexual Orientation and Gender Identity*

Domain	Questions	Responses	
Sexual Orientation and Gender Identity	Do you consider yourself to be:	1	1 Straight
		2	2 - Lesbian or gay
		3	3 - Bisexual
		4	Other
		7	Don't know/Not sure
		9	Refused

ACRONYMS

ACA – Affordable Care Act

ACS – American Cancer Society

AOSW – Association of Oncology Social Work

BRFSS – Behavioral Risk Factor Surveillance System

CBE – Clinical Breast Exam

CDC – Center for Disease Control

IOM – Institute of Medicine

LGBT – Lesbian, gay, bisexual, and transgender

NAACCR - North American Association of Central Cancer Registries

NASW – National Association of Social Work

NCI – National Cancer Institute

ODPHP - Office of Disease Prevention and Health Promotion

SEER - Surveillance, Epidemiology, and End Results Program

SES – Socioeconomic status

USCS - United States Cancer Statistics

USDA – United States Department of Agriculture

USDHHS – US Department of Health and Human Services

DEFINITIONS

Behavioral risk factor - Lifestyle (behavioral) risks that may increase the risk of an individual receiving a breast cancer diagnosis - may include tobacco use, alcohol consumption, diet, obesity, use of birth control and hormone replacement therapy, childbearing status, and lack of physical activity

Cultural competence – standard in social work practice that requires self-awareness, cultural humility, and the commitment to gaining knowledge, understanding and embracing culture as vital to effective practice.

Health disparity - a type of health difference that is closely linked with social, economic, and/or environmental disadvantage.

Incidence rate - the measure of the frequency with which a disease occurs in a population over a specified time period; conveys information about the risk of contracting the disease.

Intersectionality - examines the multiple identities of individuals and the ways in which they interact and recognizes simultaneous dimensions of inequality; used to understand principles of social inequality and its relationship to marginalized communities based on race, ethnicity, socioeconomic class, and geographic locations. The perspective considers the social construction of race, institutionalized practices and policies of inequality (social, structural, political), acknowledges the importance of the way members of minority populations are viewed and depicted in society, and the historical and social experiences within and between sexual and gender minority groups with respect to the multiple dimensions in which they identify.

Lesbian – a female who experiences sexual attraction or a romantic attraction to another female.

LGBT – Lesbian, gay, bisexual, transgender

Mortality rate – the number of deaths due to a disease divided by the total population.

NASW Code of Ethics - identifies core values on which social work's mission is based; summarizes ethical principles that represents core values of the profession and ethical standards that should be used to guide social work practice.

Non-behavioral risk factor- breast cancer risk factors that are non-behavior related that include gender, aging, genetic, family history, previous breast cancer diagnosis, race and ethnicity, dense breast tissue, and development of benign breast conditions

Nullparity – term used to describe a woman who has not given birth to a child.

Sexual orientation – term used to signify the gender in which a person is attracted to.

Social justice – the view that everyone deserves equal economic, political and social rights and opportunities.

INSTITUTIONAL REVIEW BOARD LETTER

THE UNIVERSITY OF
ALABAMA®

Office of the Vice President for
Research & Economic Development
Office for Research Compliance

October 10, 2017

Vicky Carter
School of Social Work
Box 870314

Re: Breast Cancer Risk Factors in a Sexual Minority Population: An Examination of the
2014 and 2015 Behavioral Risk Factor Surveillance System

Dear Vicki Carter:

This letter comes as a response to your communication received on October 4, 2017.
According to the Office for Human Research Protection (OHRP) under policy 45 CFR
46.101 the proposed work is not human subjects research.

Because the work is not considered human subjects research, it does not require IRB
approval and is therefore excluded from review by the IRB.

If you have any questions or if I can be of further assistance please do not hesitate to
contact me.

Sincerely,

Carpantanto T. Myles, MSM, CIM, CIP
Director & Research Compliance Officer

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