EFFECTS OF PHYSICAL ACTIVITY ON COMMUNITY PARTICIPATION AMONG BREAST CANCER PATIENTS

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DEDICATION

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by

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THESIS

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Abstract

BACKGROUND: Breast cancer patients who engage in physical activity are shown to have a reduction in difficulties during daily living as a result of treatment side effects; however, it is unknown if participation in physical activity will reduce the limitations experienced by these individuals while participating in community activities.

SUBJECTS: Female breast cancer patients, with a mean age of 51.81(SD = 7.88, range 30-64), diagnosed with stage 1 (*n* = 16, 21.3%), stage II (*n* = 37, 49.3%), stage III (*n* = 15, 20.0%) cancer who have completed chemotherapy (*n* = 63, 84.0%), are undergoing chemotherapy (*n* = 9, 12.0%), or have not yet started chemotherapy (*n* = 1, 1.3%). The majority of the participants were individuals were employed full time (*n* = 39, 52.0%), employed part time (*n* = 13, 17.3%). The majority of these women were married (*n* = 49) or divorced (*n* = 11). These women were college graduates (*n* = 30) or finished some graduate school (*n* = 20). These participants were European American (*n* = 34, 45.3%) and African American (*n* = 13, 17.3%). The BMI of these participants had a mean of 27.28 with a range from 16.30 to 44.81(SD = 5.35). Some of these individuals (*n* = 53) reported co-occuring medical conditions such as high cholesterol, high blood pressure, diabetes, and being overweight.

METHOD: We recruited female breast cancer patients between the age of 18-66, with stage I, II, or III cancer, who are starting, in the process of, or have completed chemotherapy. Participants who met the inclusion criteria were selected to participate. Research assistants invited these patients to volunteer the survey study. For the current study purpose, we analyzed the association between the International Physical Activity Questionnaire (IPAQ) and the World Health Organization Disability Assessment Scale version 2.0 (WHODAS 2.0), using the Pearson product-moment correlation at the level of statistical significance at .05. The survey packages

were sent to the participants through the United States Postal Service. Once the surveys were returned by mail the participants received a $10 gift card for compensation.

RESULTS: A significant negative association was observed between limitations in participation in society (r = -.31, p =.004, medium effect size) and walking. Significant negative associations were also discovered between the limitations in life activities and vigorous activity (r = -.24, p = .023, small to medium effect size), along with walking (r = -.23, p = 0.25, small to medium effect size). Lastly, a significant negative association was seen between the limitations in communication and understanding and walking (r = -.20, p = .046, small to medium effect size).

DISCUSSION: Engaging in physical activity decreases the limitations in understanding and communication, life activities, and participation in society an individual encounters. Vigorous activity is not required to experience reductions in community limitations. Simply engaging in light physical activity, like walking, produces results.

Keywords: physical activity, community participation, breast cancer, chemotherapy,

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WHODAS 2.0 – World Health Organization Disability Assessment Scale 2.0

IPAQ – International Physical Activity Questionnaire

PA – Physical Activity

CP – Community Participation

CHAPTER ONE

Introduction

Since the improvement of cancer treatment, survivorship for breast cancer has increased to 79% (Moller et al., 2013). However, the latent effects of this treatment, like fatigue, cognitive difficulties, loss of the ability to engage in daily activities, and a decrease in psychological wellbeing, have decreased the overall quality of life of these survivors (Banning, 2011; Feuerstein, 2007; Galiano-Castillo et al., 2013; National Institutes of Health, 2013c). The physical, psychological, and financial costs of cancer treatment can have a significant impact on activities of daily living, specifically physical activities (i.e. exercising, household chores, ambulating at home or around the community), social activities (i.e. participating in church or other organizations, going on social outings with friends and family), employment, self-care, and other various activities. More specifically, employment is a particularly strong indicator of an individual's ability to participate community activities overall. A study done by Feuerstein (2007) found that 18.2 percent of cancer survivors were employed post-treatment; however, they continued to endorse problems with employment due to their chronic illness. Specific breast cancer data reflects that of these individuals, 16% struggled to obtain life insurance and 7% lost their health insurance shortly following their breast cancer diagnosis (Feuerstein, 2007). This is prime indication of how a chronic illness impacts an individual's life, as many cancer survivors believe that the ability to return to their prior job is the final step in being able to claim they are entirely recovered (de Boer, Taskila, Ojajarvi, van Dijk, & Verbeek, 2009).

Some side effects of breast cancer treatment often cause difficulties during activities of daily living. Some of the many symptoms of breast cancer treatment are fatigue, loss of energy, nausea and vomiting, and overall loss of lean muscle mass (National Institutes of Health, 2013).

However, physical activity can counter this process. Exercise has a range of physiological effects that can be beneficial to cancer patients and survivors during and after treatment. The act of engaging in physical activity can increase the cancer patient's ability to perform daily activities and maintain a higher activity level (Feuerstein, 2007). The reduction in chemotherapy related symptoms like fatigue, loss of lean muscle mass, decreased mobility by the improvement of physical, psychological, and social wellbeing will increase the likelihood of these survivors to return to work and engage in meaningful community and daily activities (Banning, 2011; Galiano-Castillo et al., 2013).

The purpose of the present study is to determine if participation in physical activity reduces the amount of difficulties breast cancer patients encounter during community participation.

CHAPTER TWO

Review of the Literature

Breast Cancer

According to the National Cancer Institute, cancer is a disease "in which abnormal cells divide without control and are able to invade other tissues." Cancer cells can spread to other parts of the body through the blood and lymph systems (National Institutes of Health, 2013a). The term cancer and tumor are often regarded as synonymous, however not all tumors are cancerous (National Institutes of Health, 2013a). Tumors, or irregular growth of cells, serve no function and can interfere with an individual's health and the function of healthy tissue. Some tumors are benign, or non-cancerous, while others are malignant, or cancerous (National Institutes of Health, 2013a). When a mutation, or alteration, occurs in the DNA within a cell, cancer can result. As a result, the mechanism influencing cell replication is compromised, which causes rapid growth followed by regular cells dying within the tissue (Falvo, 2013).

The National Cancer Institute (2013a) defines breast cancer as, "Cancer that forms in tissues of the breast, usually the ducts (tubes that carry milk to the nipple) and lobules (glands that make milk)" (National Institues of Health, 2013a). According to Lewis and Borgen (2012), breast cancer involves a large and complex system of related health conditions (as cited in Falvo, 2013). The most common cancer affecting women worldwide is breast cancer. Men can also be diagnosed with breast cancer; however, it is far less common (Falvo, 2013; Hoyer et al., 2012). According to the National Institutes of Health (2013a) there are 232,340 new cases of breast cancer diagnosed per year in women, along with 2,240 per year in men. Conversely, there are 39,620 deaths per year in females with breast cancer, and 410 deaths per year in males with breast cancer (National Institues of Health, 2013a). Breast cancer occurs at a rate of 123.8 per

100,000 women per year. As of January 1, 2010, approximately 2,829,041 women were living with a history of breast cancer in the United States (Howlader et al., 2013).

Treatment approaches for breast cancer can be local, regional, or systemic in nature; these approaches have changed over time. Previously, the breast was removed in a surgical procedure called a mastectomy, or the entire breast, all the tissue, muscles, and lymph nodes were removed in a radical mastectomy (Falvo, 2013). According to Lewis and Borgen (2012), a more conservative approach is as effective as the invasive one and often includes a lumpectomy, removing the cancerous lesion and some of the surrounding tissue, and a partial or segmental mastectomy, removal of a piece of the breast (as cited in Falvo, 2013). Often, regardless of the size or location of the tumor, radiation and chemotherapy are used as supplemental treatments. Hormone therapy has also become a viable option, such as Tamoxifen, which blocks the estrogen hormone that causes the cancer. Following treatment many women choose to have their breasts reconstructed to allow for a sense of returning to normal (Falvo, 2013).

Stages of breast cancer. Upon breast cancer diagnosis, a variety of testing can evaluate the stage and severity of the cancer. Determining whether the cancer has spread to other parts of the body is how breast cancer stages are determined. Falvo (2013) suggests that early identification of breast cancer can be predictive of the outcome and cure. Early intervention can occur sooner with the help of self-examination and mammography screenings. The type of treatment will be determined depending on the stage and time of the identification of the breast cancer. It is important to know the stage of the cancer in order to properly determine a treatment plan (National Institutes of Health, 2013b).

Stage 0. Stage 0 represents carcinoma in situ. According to the National Institutes of Health (2013b) there are three types of carcinoma in situ: ductal carcinoma in situ (DCIS), lobular carcinoma in situ (LCIS), and Paget disease of the nipple. DCIS is a non-invasive condition where abnormal cells are found in the lining of the breast duct; the abnormal cells residing in the duct have not invaded other tissues in the breast. The National Institutes of Health (2013b) note it is possible for DCIS to become invasive and invade other tissue; however, there is no way to know which lesions could become invasive. LCIS is a condition in which abnormal cells are found in the lobules of the breast. If LCIS is found in one breast, the likelihood of developing breast cancer in the opposite breast increases. Paget disease of the nipple occurs when the abnormal cells reside in the nipple only (National Institutes of Health, 2013b).

Stage I. Stage I cancer is divided into stages IA and IB. During stage IA, the tumor is two centimeters or smaller and the cancer has not spread outside the breast. During stage IB, small clusters of breast cancer cells larger than .2 millimeters but smaller than two centimeters are found in the lymph nodes and either no tumor is in the breast or the tumor is two centimeters or smaller (National Institutes of Health, 2013b).

Stage II. Stage II is divided into IIA and IIB. Stage IIA refers to three possible scenarios. In the first scenario, there is no tumor in the breast or a tumor of two centimeters or smaller exists. In the second scenario, a tumor larger than two centimeters is located in one to three axillary lymph nodes or near the breastbone. In the third scenario, the cancer must be larger than two centimeters but not larger than five centimeters and cannot have spread to the lymph nodes (National Institutes of Health, 2013b). Stage IIB is diagnosed in three situations. According to the National Institutes of Health (2013b), in the first situation the tumor is larger

than two centimeters, but does not exceed five centimeters, along with small clusters of the breast cancer cells found in the lymph nodes, measuring larger than 0.2 millimeters not exceeding 2 millimeters. In the second situation, the tumor is larger than two centimeters but does not exceed 5 centimeters, or the cancer has spread to at least one to three axillary lymph nodes or to the lymph nodes located close to the breastbone. In the last case, the tumor is larger than five centimeters, and the cancer has not spread to any of the lymph nodes (National Institutes of Health, 2013b).

Stage III. Stage III breast cancer is categorized by IIIA, IIIB, and IIIC. According to the National Institutes of Health (2013b), stage IIIA is defined as having no tumor in the breast or a tumor is of any size, and if the cancer is found in four to nine of the axillary lymph nodes or in the lymph nodes near the breastbone. The second case for stage IIIA is the tumor is larger than five centimeters and small clusters of breast cancer cells found in the lymph nodes measuring larger than 0.2 millimeters but not exceeding two millimeters. The final case in which IIIA diagnosis occurs is when the tumor is larger than five centimeters and the cancer has spread to one to three of the axillary lymph nodes or to the lymph nodes near the breast bone (National Institutes of Health, 2013b). Stage IIIB diagnosis is determined when there is a tumor of any size that has spread to the chest wall or the skin of the breast resulting in an ulcer and swelling. Stage IIIB can be diagnosed when the cancer has spread to a maximum of nine axillary lymph nodes or any lymph nodes near the breastbone. Cancer that has spread to the skin of the breast may be referred to as inflammatory breast cancer (National Institutes of Health, 2013b). Inflammatory breast cancer causes the breast to become inflamed and warm to the touch due to the cancer cells blocking the lymph vessels in the skin. Peau d'orange, which means "like skin of an orange," also occurs with inflammatory breast cancer. This refers to the dimpling of the

skin of the breast and the inversion of the nipple. This can also prevent any lumps from being felt during an examination and can occur in stages IIIA, IIIB, IIIC, and IV (National Institutes of Health, 2013b). Stage IIIC occurs when no tumor or a tumor of any size is found in the breast, or when the cancer has spread to ten or more of the axillary lymph nodes, either above or below the collarbone or in the axillary lymph nodes or lymph nodes near the breastbone. Treatment for stage IIIC is either operable or inoperable (National Institutes of Health, 2013b).

Stage IV. According to the National Institutes of Health (2013b), stage IV cancer occurs when the cancer has spread to other organs, bones, or the brain. Recurrent breast cancer diagnoses occur when the cancer returns after being treated and occurs in all stages.

Identification of Breast Cancer

According to the National Institutes of Health (2013b), some of the tests administered to determine the stage of the cancer are:

Sentinel lymph node biopsy. The sentinel lymph node is the first lymph node that receives lymphatic drainage from a tumor. A radioactive substance, or blue dye, is injected at a site close to the tumor and flows through the lymph ducts to the nodes. The first node to receive the dye is removed by surgery. Upon removal, a pathologist looks at the tissue under a microscope. If further cancer cells are not identified more ducts may not need to be removed.

Chest x-ray. The chest x-ray sends energy beams that penetrate the body and tissues to capture pictures of the organs and bones, allowing for a clearer picture.

CT scan (CAT Scan). The CT or CAT scan takes a series of pictures from various angles to give an even clearer picture than an x-ray. Dye injected intravenously or ingested helps the organs or tissues show up more clearly.

Bone scan. The bone scan examines the bones for rapidly dividing cells, like cancer cells. A small amount of radioactive material is injected into a vein and the material travels through the bloodstream, collects in the bones, and is detected by the scanner.

PET scan (positron emission tomography scan). The PET scan specifically locates malignant tumor cells in the body. A small amount of radioactive glucose (sugar) is injected into a vein. The scanner rotates around the individual's body looking for places where glucose is used in the body. Malignant tumor cells show up brighter than typical cells in this testing.

Treatment

After the stage has been determined, the health care professional evaluates the most effective treatment course while considering the severity of the cancer and the cancer's profile. Some of the treatment options considered are the following:

Surgery. The National Institutes of Health (2013b) wrote that one of the first treatment options available for those suffering from breast cancer is the surgical removal of the cancer, known as breast conservation surgery. There are two types of breast conserving surgery: lumpectomy and partial mastectomy. A lumpectomy removes the tumor, or lump, along with a minimal amount of tissue surrounding it. A partial mastectomy, referred to as a segmented mastectomy, occurs when the cancerous part of the breast is removed along with the lining of the chest muscles where the cancer resided (National Institutes of Health, 2013b). Those patients who have breast-conserving surgery may have their lymph nodes biopsied as well, referred to as a lymph node dissection. Another type of surgery is a simple mastectomy, which removes the entire cancerous breast. Lymph nodes can also be biopsied during this procedure (National Institutes of Health, 2013b). Another type of mastectomy is a modified radical mastectomy. This surgery removes the entirety of the cancerous breast, lymph nodes under the arm, the lining

over the chest muscles, and occasionally part of the chest wall muscles themselves (National Institute of Health, 2013b). If the patient undergoes a mastectomy, breast reconstruction often follows immediately after the surgery or at a future date. The reconstruction can be done with the patients' own tissue or with implants filled with saline or silicon.

Chemotherapy. According to the National Institute of Health (2013b), chemotherapy may be given to the patient before, after, or in lieu of surgery. Any treatment occurring before primary therapy, which is often surgery, is called neo-adjuvant therapy. Chemotherapy causes the tumor to shrink, reducing the amount of tissue that will need to be removed if surgery is elected to be part of the treatment (National Institutes of Health, 2013). Often the surgeon removes all of the cancer that can be clearly seen and after surgery. Post surgery, or primary treatment, the patient receives radiation therapy, chemotherapy, or hormone therapy to eradicate and remaining cancer cells (National Institutes of Health, 2013b). This post surgery type of therapy is called adjuvant therapy. Chemotherapy treatment stops the growth of the cancer cells by using certain types of medications. According to the National Institutes of Health (2013b), when ingested or given intravenously, the drugs enter the bloodstream and allow them to reach the cancer cells anywhere in the body; this is referred to as systemic chemotherapy. If the chemotherapy medication is placed directly in an organ, tissue, or cerebrospinal fluid, the drugs will mainly influence the cancer in those areas (National Institutes of Health, 2013b).

Radiation therapy. Radiation treatment uses "high energy x-rays or other types of radiation to kill cancer cells or keep them from growing" (National Institutes of Health, 2013b). External radiation sends radiation toward the cancer via a machine outside the body. Internal radiation is done via needle, seeds, wires, or catheters placed near the cancer (National Institutes of Health, 2013b).

Hormone therapy. Hormone therapy is a treatment that either removes hormones or inhibits them to cease the growth of cancer cells (National Institutes of Health, 2013b). Some hormones in the bloodstream, particularly estrogen, can promote cancer growth. When the cancer cells have hormone receptors, drugs, surgery, or radiation therapy reduce the reproduction of these cancer-causing hormones. An ovarian ablation stops the ovaries from making estrogen (National Institutes of Health, 2013b). Tamoxifen, an anti-estrogen, when accompanied by hormone therapy, is given to individuals with early stages of breast cancer or those with metastatic breast cancer, or cancer that has spread to other parts of the body (National Institutes of Health, 2013b). Although hormone therapy with Tamoxifen may stop the growth of types of breast cancers, these drugs can also act on other cells within the body, increasing the individual's chances of developing endometrial cancer (National Institutes of Health, 2013b).

The National Institutes of Health (2013b) state that hormone therapy with an aromatase inhibitor is effective treatment for some postmenopausal women suffering from hormone-dependent breast cancer. Aromatase inhibitors cause the levels of estrogen in the body to decrease by preventing the aromatase enzyme from turning into estrogen. When treating early stage breast cancer some aromatase inhibitors are used as an adjuvant therapy opposed to Tamoxifen; or the aromatase inhibitors may be used after a two-year period of using Tamoxifen (National Institutes of Health, 2013b).

Targeted therapy. Targeted therapy is treatment utilizing drugs or other substances to locate and eradicate specific cancer cells without damaging the normal cells. Two types of targeted therapies are monoclonal antibodies and tyrosine kinase inhibitors (National Institutes of Health, 2013b). Monoclonal antibody therapy is a type of infusion therapy utilizing laboratory-made antibodies from a single type of immune system cell. These antibodies have the ability to

detect certain substances on normal or cancer cells that help the cancer cells reproduce. The antibodies kill the cells where the substance is detected, inhibiting the growth and spread of the cancer (National Institutes of Health, 2013b). These antibodies transport medications, toxins, or radioactive materials directly to the cancerous cells. They can be used in coordination with chemotherapy as an adjuvant therapy. Tyrosine kinase inhibitors are target therapy drugs that interrupt the signals tumors require to grow and can be used with other anti-cancer drugs (National Institutes of Health, 2013b).

Effects of Treatment

Surgery. According to the National Cancer Institute (2014d) after a breast cancer patient has undergone a mastectomy or lumpectomy, the breast may physically look different than before the procedure. Areas surrounding the surgical site may become hardened. A risk of infection exists after the procedure. If any lymph nodes were removed during the surgery the possibility of lymphedema, a swelling in the extremities caused by lymphatic blockage, is possible. The National Cancer Institute (2014d) adds that the risk of lymphedema is a life long risk among those patients, even years after surgery.

Chemotherapy. Side effects of treatment occur when the drugs that attack and destroy the fast producing cancer cells affect the growth of healthy cells. The side effects vary from individual to individual. The cells most likely to be effected by these treatments are the blood forming cells in bone marrow, hair follicles, and cells in the digestive tract, reproductive system, and the mouth (American Cancer Society, 2010). Some medications are administered along with chemotherapy to protect the healthy, non-cancerous cells. Some of the side effects of chemotherapy include anemia, fatigue, hair loss, increased chance of infection, nausea and vomiting, constipation, digestive problems, weight gain, and nerve and muscle problems

(American Cancer Society, 2010; Gao & Dizon, 2013). While weight loss following chemotherapy may seem common across all cancers, in breast cancer weight gain is often common due to the hormone therapy and steroids used to treat the hormone driven cancer (Feuerstein, 2007; Ligibel & Strickler, 2013). Chemotherapy impacts the functioning processes of the brain like thinking, memory, concentration, and comprehension; it is often referred to as "chemo brain" or "chemo fog" (American Cancer Society, 2010; Gabo & Dizon, 2013). According to the American Cancer Society (2010), this interruption in cognitive functioning occurs when the patient is under higher doses of chemotherapy. Chemotherapy can and does affect patients' overall health, sense of wellbeing, relationships, and daily routine (American Cancer Society, 2010; Feuerstein, 2007). In a study conducted by Danieffe, Cowman, and Gooney (2013), the relationships between symptoms following chemotherapy and surgery were examined. A strong correlation was found between fatigue and depression ($\rho = 0.597$, $p < 0.01$), higher levels of fatigue being correlated with higher levels of depression (Danieffe, Cowman, & Gooney, 2013). Other studies have also found that fatigue is often brought on by the process of chemotherapy (Feuerstein, 2007). Danieffe, Cowman, and Gooney (2013) found a slight correlation between pain and fatigue in cancer patients ($\rho = -0.360$, $p < 0.01$). The same study also reported a moderate relationship between quality of life and emotional functioning ($\rho = -0.284$, $p < 0.01$). For example, a cancer patients' emotional functioning will be better if their quality of life is better. It can be assumed that levels of fatigue experienced as a result of treatment also influence emotional functioning, resulting in decreased quality of life. Some common physical consequences of surgery and chemotherapy include "difficulties with cardiopulmonary function, deterioration in lean body tissue and muscular strength and decreased range of motion," (Feuerstein, 2007). According to Feuerstein (2007), "These can all impact on

the ability to carry out activities of daily living (e.g., dressing, housework, childcare, shopping, and gardening), occupational work, and social activities and can be further compounded by fatigue." A study with breast cancer patients, done by de Jong, Candel, Schouten, Abu-Saad, and Courtens (2006), revealed that when looking at the 46 to 70 year old age group, their activity level was relatively stable except at measurements 4 (4 weeks after chemotherapy) and 5 (12 weeks after chemotherapy), where adjusted baseline differences are displayed (([DELTA][chi]^2 (1) = 5.216, P G .05) (de Jong et al.,2006). According to de Jong et al. (2006), patients were significantly more active at measurement 5 than at measurement 4. The difference in activity level between measurement 3, during the third cycle of therapy, and measurement 5, twelve weeks post therapy, was also significant ([DELTA][chi]^2 (1) = 6.418, P G .05). For the group of 45 years and younger, none of the pairwise comparisons between measurement occasions were significant; here, the activity level was constant during the whole study period (de Jong et al., 2006).

Radiation therapy. Similar to chemotherapy, this type of treatment also may have side effects that vary from individual to individual. According to the National Institutes of Health (2013c), some of the side effects are skin changes and fatigue; however, depending on the area of your body being treated more side effects may appear. These side effects may include, but are not limited to, diarrhea, hair loss at the site of treatment, mouth problems, nausea and vomiting, sexual changes, swelling, difficulty swallowing, and urinary or bladder changes (National Institutes of Health, 2013c). Skin changes occur due to the damaging effects of radiation therapy to the healthy skin cells in the area of treatment. These changes can include redness similar to sunburn in the area being treated and pruritus, or constant itching, which can lead to skin break down and infection. The individual's skin may also become dry and peel and may develop sores

or ulcers due to the skin peeling before new skin can grow. This occurs most commonly in the folds of skin like the buttocks, the breasts, the ears, or wherever skin is sensitive (National Institutes of Health, 2013c). The skin may also swell and become puffy. The side effects begin a few weeks into treatment and end a few weeks after treatment is finished. However, even after treatment ends, the skin may remain dry, sensitive to sunlight, and the individual has increased risk of skin cancer in the treatment area (National Institutes of Health, 2013c). To manage the skin changes, it is advisable to remain in cool, humid areas, use soft fabrics, avoid clothing that is tight or does not allow circulation of air, and avoid any adhesive materials.

Hormone therapy. The side effects of this type of treatment vary similarly to chemotherapy and radiation therapy. However, the most common side effects are fatigue, hot flashes, mood swings, and vaginal dryness or discharge (American Cancer Society, 2013b). If the cancer has metastasized to the bones, a tumor flare may occur. This causes pain and swelling in the muscles and bones. This tends to resolve quickly but can cause a high calcium concentration in the blood, requiring treatment to stop temporarily (American Cancer Society, 2013b). This type of treatment may increase the risk for development of cancers of the uterus, like endometrial cancer and uterine sarcoma, in women who are postmenopausal (American Cancer Society, 2013b). Blood clots are another serious condition caused by these medications. According to the American Cancer Society (2013b), deep venous thrombosis can occur. Pieces of the blood may break apart and block vital arteries within the lungs, causing pulmonary embolism. Strokes can also occur in women receiving this treatment. While chemotherapy, radiation, and surgery are effective treatments for cancer, physical activity can also be an effective method to help aid in the recovery and healing process.

Breast Cancer as a Disability

A disability is a condition that substantially limits daily function (Rubin & Roessler, 2008). Any individual diagnosed with breast cancer is considered to have a disability. Many individuals experience a variety of symptoms due to this chronic illness. These symptoms include a loss of energy, fatigue, pain, phantom breast pain, shoulder and arm pain, post mastectomy syndrome, along with other various psychological issues like depression, anxiety, and stress (de Boer et al., 2009). All of these symptoms cause issues for the individual in the community, particularly in the work place. Difficulty combining treatment with full-time work due to physical or mental limitations is common (de Boer et al., 2009). Ganz et al. (2013) discovered that 23.3% of 3000 breast cancer patients experienced higher memory complaints while 19.0% of breast cancer patients reported higher-level cognitive complaints. The women reporting more incidents of higher memory complaints were more likely to have received chemotherapy and radiation therapy when compared to women with normal complaints (59.1% vs 35.2%, $p = .004$) (Ganz et al. (2013). Women complaining of higher-level cognitive complaints also were more likely to have received chemotherapy and radiation therapy than those women with normal complaints (58.3% vs. 36.6%, $p = .02$) (Ganz et al., 2013). In the study conducted by Ganz et al. (2013), a relationship between cognitive complaints and the scores of neuropsychological testing was discovered. Those women complaining of higher level cognitive issues had worse performance on psychomotor speed ($P = .01$) and executive functioning ($P = .003$); however, they tended to perform better on visual memory testing ($P = .04$) when compared to healthy controls (Ganz et al., 2013). It is reported that women who have undergone long-term postmenopausal hormone therapy have better visual memory on neuropsychological testing and when completing a visual memory task while being examined by

brain imaging, indicating that hormone treatment may have less impact cognitively (Ganz et al., 2013). The deficits in memory and executive functioning could create limits to daily functioning at home, in the community, and as an employee. At work, tasks may require some modification to accommodate current cognitive state.

In Mosher et al.'s (2013) qualitative study on issues surrounding breast cancer, some major concerns reported among women with metastatic breast cancer were the loss of control over their life, future disease progression, and disability. Also mentioned was the emotional strain associated with the necessary but frequent medical appointments for their condition that often interrupt daily activities (Mosher et al., 2013). The women in the study also expressed feelings of guilt and frustration due to uncontrollable fatigue and pain disrupting their daily routines. Some women attributed their loss of self-concept to the inability to work as they once did (Mosher et al., 2013). The women in the Mosher et al. (2013) study reported that social constraints were also a major issue. Some women reported that individuals in their close relationships were often in denial of the severity of their condition and some even refused to discuss the illness and it's prognosis due to discomfort around the topic; this social discomfort greatly affects the abilities of women to engage in activities and work (Mosher et al., 2013). Their issues include more than the physical and psychological ones typically reported; a social aspect is also prominent. A participant in Mosher et al. (2013) wrote in an expressive essay that breast cancer "…alienates you from a vast majority of people that you know"; she continued stating, "[breast cancer] leaves you feeling alone in the truest sense of the word."

Physical Activity

Sufficient evidence supports that physical activity helps to prevent and manage serious medical conditions like heart disease, high cholesterol, obesity, and high blood pressure

(American Cancer Society, 2012). According to the American Cancer Society (2012) one third of the deaths caused by cancer are linked to diet and physical activity. A study done by the International Agency for Research on cancer stated that 25% of breast cancer cases are a result of obesity and sedentary lifestyle (Hutchison, 2003). Zhao et al. (2013) emphasize that being physically active improves physical functioning, health related quality of life, reduces risk for recurrent or new cancers, and decreases the level of cancer mortality among cancer survivors. Knols, Aaronson, Uebelhart, Fransen, and Aufdemkampe (2005) emphasize that physical activity alone is not enough to decrease the weight of cancer patients post treatment.

Consuming a healthy diet, maintaining a healthy weight, and participating in an active lifestyle reduce the overall lifetime risk of developing or dying from cancer (American Cancer Society, 2012). Protein supplements alongside resistance exercise programs may increase muscle strength and functional ability (Knols et al., (2005). They also recommend a healthy diet along with improving body image and self-acceptance (Knols et al. (2005). Physical activity is known to help cancer patients maintain self-efficacy and their ability to execute daily functions and activities (Phillips & McAuley, 2013). Phillips and McAuley (2013) indicated that more active breast cancer patients, at baseline, reported significantly ($p < .05$) higher self-efficacy ($\beta = 0.53$). Phillips and McAuley (2013) stated that women who are more self-efficacious reported significantly better physical ($\beta = 0.29$, $p < .05$), emotional ($\beta = .22$), functional ($\beta = .32$), and social ($\beta = 0.16$) well-being along with a better quality of life. During a six-month follow up of the study, changes in physical activity were associated with changes in self-efficacy ($\beta = .30$). Changes in self-efficacy lead to changes in physical ($\beta = .14$), emotional ($\beta = .08$), functional ($\beta = .18$), and social ($\beta = .09$) well-being. When these cancer patients participate in physical

activity, they are less likely to succumb to the health risks involved with a sedentary lifestyle (Feuerstein, 2007).

Exercise has a range of physiological benefits, which are beneficial during treatment and after. According to Feuerstein (2007), "cardio-respiratory fitness refers to the ability to maintain a level of physical activity for a continuous period of time and involves the cardiovascular, respiratory, and musculoskeletal systems of the body. Cardio-respiratory fitness has been shown to be a strong predictor of mortality in both healthy individuals and those with a chronic illness." Aerobic exercise is associated with a variety of outcomes, such as increased cardio-respiratory function, endurance, exercise ability, decreasing resting heart rate, balancing body composition, and increasing abilities at work, during recreation, and in sporting activities (Feuerstein, 2007). Aerobic exercise helps with depression, anxiety, and overall psychological wellbeing (Feuerstein, 2007; Penedo & Dahn, 2005). Mutrie et al. (2007) conducted a study among women diagnosed with breast cancer, stage 0 to III. In this study, women participated in a supervised group exercise program that entailed a warm up, a twenty-minute exercise period, a cool down, and relaxation time. These women were encouraged to participate in two classes and at least one exercise regimen at home. The women in the intervention group, when compared with the control group, reported less visits to their general practitioner (p =.044) and fewer nights in the hospital (p = .044) (Mutrie et al., 2007). According to Phillips and McAuley (2013), breast cancer survivors who reported being more active reported significantly ($p < .05$) higher self-efficacy ($\beta = 0.53$). Those women who reported significantly ($p \leq .05$) higher self-efficacy also reported a higher sense of physical ($\beta = .29$), emotional ($\beta = .22$), functional ($\beta = .312$), and social well-being ($\beta = .29$); these women also reported higher global quality of life scores. Individuals with greater amounts of body fat are prone to develop various chronic illnesses;

however, changes in body composition are able to reverse this outcome (Feuerstein, 2007). According to Feuerstein (2007) there is compelling evidence suggesting risk reduction due to physical activity in colon and breast cancer patients.

Motivating individuals to exercise and change their behaviors is a major challenge in any population, especially in populations with cancer-caused fatigue and pain (Feuerstein, 2007). Feuerstein (2007) believes a change in lifestyle is more difficult among a population with chronic illness, like breast cancer survivors. According to de Jong, Candel, Schouten, Abu-Saad, and Courtens (2006) fatigue increases when physical activity decreases. Mutrie et al. (2007) explain that activity levels decrease significantly in those diagnosed with breast cancer and the activity level remains low after treatment is completed. According to Volaklis, Halle, and Tomakidis (2013), on average, breast cancer survivors reduce their physical activity levels by two hours per week when compared to levels before diagnosis. Irwin et al. (2008) examined the influence of physical activity on 933 participants who were breast cancer survivors. Irwin et al. (2008) reported that, when compared to women who were inactive and remained inactive after diagnosis, those women who increased their physical activity decreased their risk of death by 45% (as cited in Volaklis, Halle, & Tomakidis, 2013). According to Irwin et al. (2004), only 32%, out of 654 participants with breast cancer practiced the recommended amount of physical activity, which was 150 minutes per week of vigorous activity (as cited in Volaklis, Halle, & Tomakidis, 2013). The reduction in physical activity following the removal of cancer or treatment for breast cancer also attributes to weight gain, often leading to obesity and increased mortality rates (Feuerstein, 2007; Hutchison, 2003). Weight loss and physical activity reduce levels of insulin; high levels of insulin can lead to cancer recurrence and death (Befort et al., 2012).

The benefits of maintaining fitness during treatment and increasing it post treatment are numerous when considering daily functions and leisure activities; for example, stretching and strengthening exercises increase range of motion, enabling individuals to participate in daily activities, more easily (Feuerstein, 2007; Valaklis, Halle & Tomadkis, 2013). Taminga, de Boer, Verbeek, and Frings-Dressen (2012) report during a qualitative study a participant reported she "felt difficulties in household tasks," like laundry and lifting heavy loads. Levy et al. (2012) reported that of 115 women, 60% reported issues with flexion, and abduction; 25% experienced difficulty with external rotation of the shoulder, on the affected side of the body, one month post-surgery. They found a significant relationship ($p \leq .001$) exists between range of motion and the number of nodes removed from the individual, affecting flexion, abduction, internal and external rotation (Levy et al., 2012). Levy et al. (2012) discovered that that more physical activity per week in the first month of recovery, in minutes, significantly ($p \leq .04$) relates to improved range of motion in that month. Not only does exercise training increase range of motion, but it can positively affect biomarkers like leukocytes, T helper cells, metabolic hormones, inflammation markers, and sex hormones, which contributes significantly to the prognosis of the patients (Valaklis, Halle, & Tomakidis, 2013). Zielinski, Muenchow, Wallig, Horn, and Woods (2004) conducted a study with post diagnosis animal models of carcinogenesis that showed an association between exercise and the inhibition of primary tumor growth and a decrease in metastatic dissemination (as cited in Valaklis, Halle, & Tomakidis, 2013). Valaklis, Halle, and Tomakidis (2013) suggest that vigorous sport or recreational-type physical activity be utilized in breast cancer patients' rehabilitation to achieve better recovery and to improve their health status along with their prognosis.

Psychological well being. Evidence has surfaced showing individuals who survive cancer are at an increased risk for anxiety, depression, post-traumatic stress disorder, and various other psychological issues (Zhao, Li, Li, & Balluz, 2012). The development of these psychological illnesses have the capability to exacerbate the individuals already difficult symptoms, like fatigue, pain, stress, and sadness and in turn effect their quality of life (Zhao et al., 2012). Quality of life can be measured in several categories: for example, physical, psychological, social, economic and spiritual wellbeing (Gabo & Dizon, 2013; Feuerstein, 2007). However, Zhao et al. (2012) report studies have shown that participation in physical activity decreased levels of depressive symptoms, psychological distress, anxiety, and improved physical functioning and health related quality of life. Zhao et al. (2013) report that in a sample of cancer survivors and adults with no cancer history, the prevalence of serious psychological distress decreased with increased levels of physical activity. A Chi Square test of 55,252 participants showed when physically inactive cancer survivors were compared with those survivors who engaged in physical activity, the prevalence rate of serious psychological distress was 62% lower in those from 0 to 150 minutes of physical activity ($p \leq .001$). The rate was 61% ($p \leq .001$) lower among those who engaged in physical activity for more than 150 minutes (Zhao et al., 2013). Zhao et al. (2013) reported that overall 14% (95 % CI 12.3–16.0 %) of cancer survivors reported using mental health services. Among cancer survivors who participate in physical activity and those adults with no cancer history, the prevalence of using mental health services decreased, linearly, with increasing levels of physical activity (Zhao et al., 2013). The prevalence rates for receiving mental health services were 24 % (p =.112) lower in survivors participating in 0 to 150 minutes of physical activity. The prevalence was 33 % (p =.021) lower in those cancer survivors participating in physical activity for more than 150 minutes (Zhao et

al., 2013). There was, however, an inverse association of physical activity with receiving mental health services among those women with breast cancer or reproductive cancers (Zhao et al., 2013).

Community Participation

In order to understand the significance of community participation among breast cancer survivors it must be defined. The World Health Organization (WHO) uses the International Classification of Functioning, Disability, and Health (ICF) to describe various aspects of functioning. More specifically, the ICF describes activities and participation in nine different domains. These domains include: learning and applying knowledge, general tasks and demands of everyday life, communication, mobility, self care, domestic life, interpersonal interactions and relationships, and, finally, community social and civic life (World Health Organization, 2013). These domains are compiled into the World Health Organization Disability Assessment Schedule 2.0, which measures the magnitude of an individual's disability due to a major medical illness.

Since the improvement of cancer treatment and diagnosis, at least 59% of individuals will survive their cancer up to 5 years post diagnosis (Hoyer et al., 2012). As survivors are now living longer, more productive lives, the need for new treatment interventions is increasing; however, encouraging individuals to maintain their health outside of treatment could be the best policy to maintain health and functioning. In a study done by Mosher et al. (2013), of 90 women with breast cancer, participants expressed frustration with the interruption of their daily activities. These daily activities can vary from cognitive difficulties such as holding conversations, concentration, and memory. Physical hindrances also occur, for example: difficulty grooming, trouble moving around the home and in public, completing housework and

other daily duties. Cancer survivors also experience other types of issues aside from the physical and emotional: for example, workplace discrimination, isolation, and difficulty reintegrating into the work environment (Feuerstein, 2007). Younger women diagnosed with breast cancer have prolonged absences due to the difficulty of treatment; however, new types of chemotherapy treatment are increasing survival rates, allowing women to return to work (Hoyer et al., 2012).. One participant wrote, "My identity was always tied into my professional life… and now that's been taken away from me." Interestingly, breast cancer is more common among working women and women in higher social positions (Hoyer et al., 2012). Eighteen point two percent of cancer survivors who were employed after their diagnosis encountered employment issues due to the discovery of their cancer (Feuerstein, 2007). Hoyer et al. (2012) reported woman diagnosed with breast cancer have more absences due to sickness and higher levels of unemployment. According to Ashing-Giwa et al. (2004) some women felt such financial strain they missed cycles of chemotherapy rather than take periods of time off from work (as cited in Banning, 2011).

Many aspects of breast cancer survivors' lives can influence their ability to return to work, including cancer-related fatigue, depression, and decreased quality of life (Banning, 2011; Galiano-Castillo et al., 2013). Galiano-Castillo et al. (2013) explain that physical activity and depression have a bidirectional relationship; when one increases, the other decreases. They further explained that depression has a negative impact on psychological, physical, social, and health-related quality of life (measured with variables like breast pain, arm pain, deterioration of sexual activity, and ability to have future perspective) of breast cancer survivors, much like other symptoms like pain and fatigue (Galiano-Castillo et al., 2013). The loss of the meaning of life and health can occur once a woman is diagnosed with breast cancer (Galiano-Castillo et al.,

2013). In a study of 108 breast cancer survivors, conducted by Galiano-Castillo et al. (2013), significant positive correlations were found between depressed mood and fatigue ($r = .57$, $p < .001$); depressed mood and systemic side effects ($r = .46$, $p \leq .001$); depressed mood and shoulder pain ($r = .33$, $p = .001$); depressed mood and breast symptoms ($r = .30$, $p = .001$); and depressed mood and arm symptoms ($r = .28$, $p = .003$). Conversely, negative relationships were observed between depressed mood and body image ($r = -.41$, $p \leq .001$); depressed mood and future perspective ($r = -.37$, $p \leq .001$); depressed mood and force handgrip ($r = -.25$, $p = .01$); and depressed mood and physical activity level ($r = -.19$, $p = .04$). As depressed mood has strong relationships with these variables, increasing physical activity can improve depressed mood along with the other expressed symptoms (Galiano-Castillo, 2013). Galiano-Castillo et al. (2013) continue saying that participation in physical activities that focus on improving function and muscle strength help to manage the depression; encouragement to participate in physical activity through support organizations can also help to decrease depressed mood.

Knols et al. (2005) conducted a systematic review of exercise and cancer. Sample sizes ranged from 14 to 123. According to Winningham et al. (1989) exercise significantly ($p < .05$) improved body composition of participants (as cited in Knols et al., 2005). Increases were also seen in bone mineral density and functional capacity ($p < .05$) (as cited in Knols et al., 2005). According to Mock et al. (1994), Mock et al. (1997), and Pickett et al. (2002) significant ($p < .05$) increases in muscle strength were also seen (as cited in Knols et al., 2005). Self-reported improvements were also noted by Mock et al. (1994), Mock et al. (1997), Mock et al. (2001), and Winningham et al. (1988) including symptom relief, psychological wellbeing, improved mood status, and quality of life (as cited in Knols et al., 2005). After treatment for breast cancer, positive results were also seen (Knols et al., 2005). According to Mcneely (2004) significant

improvements ($p < .05$) were made on the range of motion of the shoulder (as cited in Knols et al., 2005). Segal et al. (2003) noted significant differences ($p < .05$) in physical fitness, fatigue, and self-reported quality of life (as cited in Knols et al., 2005). Knols et al. (2005) indicated that with improvements in mobility of the arm, fatigue, and quality of life, breast cancer patients can return to work and steadily improve their work ability. A participant in a Study conducted by Tamminga, de Boer, Verbeek, and Frings-Dressen (2012) stated, "I always tried to exercise in between [treatments] … and you just notice that that is very good for your body but also for your mind … Your mind resets so to speak … and I think that it works very positively [for your work ability]."

Study Aims and Hypotheses

Many women diagnosed with breast cancer lose their ability to engage in self-care, physical activity, social gatherings, daily functions, and the reduced ability to engage in work activity, due to fatigue, depression, and social isolation (de Boer et al., 2009; Mosher et al., 2013; Tamminga et al., 2012; Zhao, Li, Li, & Balluz, 2012). Surgery, chemotherapy, radiation, and hormone therapy all influence each individual differently; however, physical, emotional, and mental effects are reported with all types of treatment (American Cancer Society, 2010; National Cancer Institute, 2014d) These side effects of treatment often disable these women, hindering their ability to perform daily tasks. Many women diagnosed with breast cancer are classified as "disabled" because of the difficulties they face on a daily basis. These difficulties include fatigue, muscle weakness, appetite change, significant weight gain/loss, along with feelings of depression and anxiety (American Cancer Society, 2010). Physical activity has shown to reduce fatigue and depression, increase mobility, and increase muscle strength in breast cancer survivors (Feuerstein, 2007; Valaklis, Halle & Tomadkis, 2013; Zhao et al., 2012). Engaging in physical

activity allows for breast cancer patients to experience increased positive physical, mental, and emotional functioning (Phillips & McAuley, 2013). This increased level of functioning also includes an increased ability to participate in community activities (Banning, 2011; Galiano-Castillo et al., 2013). These community activities include, but are not limited to, social events, communication, relationship formation, household chores, and work. Overall, engaging in physical activity during, and after, treatment for breast cancer increases the ability of the survivors to return to the level of functioning they experienced pre-diagnosis.

The purpose of this paper is to see if the amount of physical activity an individual participates in correlates with reduced community participation limitations. These limitations are physical, emotional, and mental. Physical limitations include muscle weakness, pain, and fatigue. Emotional limitations include psychological distress that can take many forms, such as fear, stress, hopelessness, and loneliness. Mental limitations include cognitive difficulties as a result of the type of treatment the patient elects to receive.

Hypothesis 1: It is hypothesized that the amount of participant physical activity, as measured by the total score of the IPAQ, is inversely correlated with limitations preventing engagement in community participation, as measured by the total score of the WHODAS 2.0.

Hypothesis 2: It is hypothesized the IPAQ will have stronger negative correlations with the physical domain of the WHODAS 2.0 (getting around, self-care, life activities) when compared to the less physical domains (understanding and communicating, getting along with people, participation in society, and work).

CHAPTER THREE

Method

Participants

Participants were obtained from a larger database of female patients diagnosed with breast cancer. They were recruited from the Simmons Cancer Center at the University of Texas at Southwestern Medical Center. The inclusion criteria for participation are a diagnosis, or previous diagnosis, of breast cancer. The cancer must be in stage I, stage II, or stage III. Sample size was 75 participants and the age range will was between 18 and 66 years old.

Measures

In addition to the demographic information collected (age, gender, race, education, self-reported weight, hip, and waist measurements). The participants also provided information about their vocation status, occupation, the number of individuals in their household, what type of health care and rehabilitation services they have received, where they participate in physical activity, and what health practices have changed for them since being diagnosed with breast cancer.

IPAQ (International physical activity questionnaire). This is a seven-item questionnaire asking about physical activities occurring during the individual's daily activities. Within the seven items, the questionnaire asks how many days a week this activity is performed, within the last seven days. The questions are grouped into vigorous, moderate, and walking/sitting. Although sitting is a category within this measure, it will not be used in this particular study. If the activity was performed the informants report how many days, followed by how many hours and minutes the activity was performed. The reported reliability coefficients for the test items range from 0.34 to 0.89, with a median score of 0.80. This scale's criterion

validity correlations range from 0.14 to 0.53. The median coefficient is 0.30 (Craig, et al., 2003). A high score on this measure indicates that the individual participates in more physical activity.

WHODAS 2.0 (World health organization disability assessment scale 2.0). This is a 36-item scale assessing functional difficulties, observed during community participation, due to health conditions. These conditions include disease and illnesses lasting for long periods of time or short periods of time, but for this study the participant is to focus on their breast cancer and its symptoms. It asks the reader to reflect over the past 30 days to answer the questions. For example, "In the past 30 days how much difficulty did you have concentrating on doing something for ten minutes?" The responder answers a 5 point likert type scale with answers of: none (0), mild (1), moderate (2), severe (3), extreme or cannot do (4). Questions are divided into seven categories of understanding and communicating, getting around, self-care, getting along with people, life activities, work, and participation in society. To score this scale, all responses within the domains are summed, allowing for a sufficient description of functioning, the maximum score for the questionnaire being 144 and the minimum score being 0. Final scores range from 0 to 100, 0 being no disability and 100 being full disability. The final three items, not included in the 36, examine how many days within the last 30 days these difficulties were present, how many days they were totally unable to carry out activities, and how many days did they have to reduce their activities. The seven domains were divided into physical and less physical domains based on face validity. There was no previous division of these domains. The physical domains were getting around, self-care, and life activities. The less physical domains were understanding and communicating, getting along with others, work, and participate in society. A high score on this measure indicates the individual experiences more limitations when participating in community activities. The intra-class correlation coefficient for this

questionnaire is 0.69 to 0.89 for items, 0.93 to 0.96 for each domain, with an overall level at 0.90. The Cronbach's alpha ranges from 0.94-0.96 (World Health Organization, 2000).

Procedure

All participants for this study were recruited from the University of Texas at Southwestern Simmons Cancer Center. File reviews were completed to select for patients who met the required criteria: women 18-66 years of age, with breast cancer at stage I, II, or III.

Once a participant was selected, a phone call was made to the patient or an invitation flyer was mailed to the participant. The individual was then informed from a call script or flyer about the purpose of the study and asked if she wishes to participate. If the participant said no, she was thanked for her time and the phone call ends. If the participant said yes, she was given a choice to come for a face-to-face appointment or to receive a packet by mail. The caller then provided their mailing address and the survey was sent to them through the mail.

Once the participant received the survey through the mail, the participant filled out and returned by prepaid envelope a consent form, a HIPAA form, a demographic form, and the measurement packet from the larger study. This packet contained nineteen various measures examining aspects of physical activity, community participation, emotional and mental well being, diet, and other various fields of information. Two questionnaires were extracted from this packet for this study. After the required paper work was completed, the participant received a $10 gift card for their participation. Initially, only six participants selected the face-to-face appointment, and subsequent data collection was done by mail. The follow up phone call was made on the scheduled day and the test-retest questionnaire administered.

Data analysis. Descriptive statistics were used to describe participants' demographic information, psychosocial status, and scores from the study's questionnaires. Seventy-five

participants were collected to achieve a medium effect size. For the first hypothesis, a Pearson's correlation was used to examine the association between physical activity, as measured by the total score on the IPAQ, and limitations in community participation, as measured by the total score on the WHODAS 2.0. It was hypothesized that physical activity and community participation limitations have a significant negative correlation. In other words, the more physical activity a participant engages in (a higher IPAQ score), fewer limitations when participating in the community were expected (a lower WHODAS 2.0 score). For the second hypothesis, after the significant negative correlations were identified, the strength of significant negative correlations within each domain of the WHODAS 2.0 were observed to determine which domains of the WHODAS 2.0 had the strongest significant negative correlations with the physical domain of the WHODAS 2.0, indicated by effect sizes (*r*).

Physical activity (PA) was measured by a self-report questionnaire, the International Physical Activity Questionnaire (IPAQ). PA was divided into three levels of PA: Vigorous PA, Moderate PA, and Walking. The World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) measured community participation. Community participation was divided into seven types of participation activities: understanding and communicating; getting around; self-care; getting along with people; life activities; work activities; and participation in society. The WHODAS 2.0 also provided three items that assess overall evaluations of community participation: days difficulties were present; days participant was totally unable to carry out daily activities; and days daily activities were reduced. Relationships between minutes of activity for each level of activity as well as total minutes of activity and amount of limitations in community participation were analyzed by the use of a Pearson's correlation.

CHAPTER FOUR

Results

Participants

This study was composed of 75 women aged 30 to 64 years old with a mean of 51.81 years. The ethnicities of these participants were as follows: 43.5 percent European American (*n* = 34), 17.3 percent African American (*n* = 13), 6.7 percent Latino American (*n* = 5), 4 percent American Indian (*n* = 3), 2.7 percent Asian American (*n* = 2), 24 percent unknown (*n* = 18).

The education levels of these 75 participants were as follows: 1.3 percent had some high school education (*n* = 1), 9.3 percent were high school graduates (*n* = 7), 21.3 percent had completed some college (*n* = 16), 40 percent were college graduates (*n* = 30), 26.7 percent were involved in graduate level study (*n* = 20), 1.3 percent were unknown (*n* = 1). The relationship status of these participants were: 65.3 percent were married (*n* = 49), 14.7 percent were divorced (*n* = 11), 12 percent were never married (*n* = 9), 2.7 percent were widowed (*n* = 2), 1.3 percent were cohabitating (*n* = 1), and 4 percent were unknown (*n* = 3). Labor force status of the participants indicated that 52.0 percent were employed full-time (*n* = 39), 17.3 percent were employed part-time (*n* = 13), 16.0 percent of these participants were unemployed (*n* = 12), 5.3 percent were retired due to breast cancer (*n* = 4), 2.7 percent volunteered part-time (*n* = 2), with 6.7 percent unknown (*n* = 5).

The collective Body Mass Index (BMI) of these participants has a mean of 27.28. The highest BMI observed was 44.81 and the lowest BMI observed was 16.30. BMI was broken down into five categories: underweight, normal, overweight, obese, and a group missing BMI information all together. One participant (1.3%) was observed to be underweight. Twenty-five participants (33.3%) were observed to be in the normal range. Thirty-one participants (41.3%)

were observed to be overweight. Sixteen participants (21.3%) were categorized as obese. Two participants (2.7%) were classified as missing BMI information.

A number of these participants were being treated for health conditions other than breast cancer. Comorbidities were as follows: twenty-two participants (29.3%) were treated for no additional health problems, one participant (1.3%) was treated only for being overweight, nine six participants (7.9%) were treated only for high blood pressure, participants (12.0%) were being treated only for high cholesterol, four participants (5.3%) were treated for only diabetes, two participants (2.7%) were being treated for high blood pressure and high cholesterol, one participant (1.3%) responded they were being treated for high blood pressure, high cholesterol, and being overweight, one participant (1.3%) was being treated for high blood pressure, high cholesterol, and diabetes, twenty-eight participants (37.5%) reported no additional health conditions.

With respect to the major disease of interest, breast cancer, the following was noted: sixteen participants (21.3%) had stage one breast cancer. Thirty-seven participants (49.3%) had stage two breast cancer. Fifteen participants (20.0%) had stage three breast cancer. Seven participants' (9.3%) breast cancer stages were unknown. When examining the time since the onsest of the cancer, the time ranged from 0 to 9 years, with a mean of 1.86 years. Of the participants in the study, one participant (1.3%) had not yet started their chemotherapy treatment. Nine participants (12.0%) completed the survey during their chemotherapy treatment. Sixty-three participants (84.0%) had completed their chemotherapy treatment, from four months to five years, at the time of the survey. Two participants (2.7%) had missing data. The Table 1 has summarized the above results.

Physical Activity

The International Physical Activity Questionnaire (IPAQ) defines vigorous activity as "activities that take hard physical effort and make you breathe much harder than normal." The questionnaire also provides examples of this type of activity such as aerobics, running, lifting, and fast bicycling. Among the 75 participants engaging in "vigorous activities" duration of engagement was between 0.0 and 1800.0 minutes per week with a mean of 136.00 minutes and (SD = 290.08). Moderate activity is described by the IPAQ as participating in "activities that make you breathe somewhat harder than normal." The examples given were carrying light loads, doubles tennis, or light bicycling. The participants reported engaging in this type of activity from 0.0 to 2880.00 minutes per week with a mean of 166.33 minutes per week (SD = 388.58). Walking was described as any type of walking done for recreation, leisure, or exercise. Participants engaged in this activity from 0.0 to 3570.0 minutes per week, with a mean of 560.433 minutes per week (SD = 806.50). The Table 2 has summarized the above results.

Community Participation

Community participation, for this study, was measured using the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0). It contains seven domains: understanding and communicating, getting around, self care, getting along with others, life activities, work, and participation in society. These domains are examined looking at the past 30 days. Each domain has a set number of questions to be ranked on a 5 point likert scale, the points being 0 (none), 1 (mild), 2 (moderate), 3 (severe), 4 (extreme or cannot do). The minimum reported score for all domains was 0.0. For "understanding and communicating", the participants could obtain a score from 0 to 24. Of 75 participants, 72 completed this domain. The maximum score was 19.00, with a mean of 2.35 (SD = 3.57). The participants could obtain a score from 0 to 20 for "getting around." Of 75 participants, 73 completed this domain. The

maximum score was 13.0, with a mean of 2.67 (SD = 3.04). Participants could obtain a maximum score of 16 for the domain "self care." Of the 75 participants, 72 completed this domain. The maximum score was 8.00, with a median of .77 (SD = 1.87). Of the possible maximum score of 20 for "getting along with others," the maximum obtained score was 15.00, with a median of 1.73 (SD = 2.59). The domain "life activities" had a maximum possible score of 16. Of the 75 participants, 72 completed this domain with a maximum score of 14.00, median of 2.91 (SD = 3.51). The domain "work" had a maximum possible score of 16. Of the 75 participants, 56 completed this domain with a maximum score of 12.00, mean of 2.19 (SD = 2.71). In the domain "participation in society," 72 of 75 participants completed the domain. The maximum possible score was 32; the maximum obtained score was 25.00, with a mean of 6.72 (SD = 5.24). Three additional questions are presented at the end of the WHODAS 2.0. Question one labeled "H1" asks how many days the difficulties discussed were present in the past 30 days. Of the 75 participants in the study, 69 completed this question with a maximum possible score of 30. The maximum reported score was 30 with a minimum of 0.0. The reported mean was 9.57 (SD = 11.16). The second question, labeled "H2" asks how many days in the past 30 days the participant was totally unable to complete daily activities due to their health condition. Of the 75 participants, 71 completed this question. The maximum possible score was 30. The maximum reported maximum score was 30 with a minimum of 0 and a mean of 2.99 (SD = 6.63). The third question, labeled "H3," asked how many days the participant reduced their activities due to their health condition. Of the 75 participants, 71 completed this question. The maximum possible score was 30. The maximum reported score was 30 with a minimum of 0 and a mean of 6.34 (SD = 8.94). The Table 3 has summarized the above results.

Physical Activity and Community Participation

When looking the association between the various levels of the IPAQ, minutes per week, and the WHODAS 2.0 significant associations ($p < .05$) were observed. Significant positive association was observed when IPAQ Moderate PA 'total minutes per week" and IPAQ Vigorous PA "total minutes per week" (N = 75, $r = .47$, $p = .000$, medium to large effect size) were compared. Another significant positive association was observed between IPAQ Walk "total minutes per week" and IPAQ Vigorous PA "total minutes per week" (N = 75, $r = -.40$, $p = .000$, medium to large effect size). A significant positive relationship was observed between IPAQ Moderate PA "total minutes per week" and IPAQ Walk PA "total minutes per week" (N = 75, $r = -.42$, $p = .000$, medium to large effect size). A significant negative association ($p < .01$) was observed between the total subscore of the limitation in the "participate in society" domain of the WHODAS 2.0 and the "walking total minutes per week" domain of the IPAQ (N = 72, $r = -.31$, $p = .004$, medium to large effect size). When the total sub-score of the limitations in the "understanding and communicating" domain was examined in relation to the IPAQ "walking" domain, a significant negative association ($p < .05$) was observed (N = 72, $r = -.20$, $p = .046$, medium to large effect size). When examining the relationship between the total sub-score of the limitations in the "life activities" domain of the WHODAS 2.0 and the "vigorous PA total minutes per week" domain of the IPAQ a significant negative relationship ($p < .05$) was observed (N = 72, $r = -.23$, $p = .023$, small to medium effect size). A statistically significant ($p < .05$) negative association was also observed between the total sub-score of the limitations in the "life activities" domain of the WHODAS 2.0 and the "IPAQ walk total minutes per week" domain (N = 72, $r = -.23$, $p = .025$, small to medium effect size). A negative association, although not statistically significant, was observed between the total sub-score of the limitations in the "participate in society" domain of the WHODAS 2.0 and the IPAQ "moderate PA total

minutes per week" (N = 72, r = -.17, p = .072, small to medium effect size). Although not statistically significant, a negative association was observed between the total sub-score of the limitations in the "getting along with others" domain of the WHODAS 2.0 and the "walk total minutes per week" domain of the IPAQ (N = 72, r = -.18, p = .074, small to medium effect size). Although not statistically significant a negative association was also observed between the total sub-score of the limitations in the "self care" domain of the WHODAS 2.0 and the "walk total minutes per week" domain of the IPAQ (N = 72, r = -.16, p = .086, small to medium effect size). Another negative association, though not statistically significant was observed between the total sub-score of the limitations in the "getting around" domain of the WHODAS 2.0 and the "moderate PA total minutes per week" domain of the IPAQ (N = 72, r = -.15, p = .098, small to medium effect size). The Table 4 has summarized the above results.

When associations were examined between all types of physical activity combined, total minutes per week and the domains of the WHODAS 2.0, statistically significant negative associations were observed. A statistically significant negative relationship ($p < .05$) was observed between the total sub-score of the limitations in the "participate in society" domain of the WHODAS 2.0 and the "All PA minutes per week" domain of the IPAQ (N = 72, r = -.26, p = .013, small to medium effect size). A statistically significant negative relationship ($p < .05$) was also observed between the total sub-score of the limitations in "life activities" domain of the WHODAS 2.0 and the "all PA minutes per week" domain of the IPAQ (N = 72, r = -.25, p = .015, small to medium effect size). Although not statistically significant, negative associations were observed between the total sub-scores of the limitations in "self care" (N = 72, r = -.17, p = .068, small to medium effect size) and the limitations in "understanding and communicating" (N

= 72, r = -.19, p = .055, small to medium effect size) domains of the WHODAS 2.0 and the "all PA minutes per week" domain of the IPAQ. The Table 5 has summarized the above results.

When the associations between the three supplemental questions in the WHODAS 2.0 and the IPAQ were examined two negative significant relationships ($p < .05$) were observed A statistically significant negative relationship was observed between the limitations described by the WHODAS 2.0 were present over the last 30 days and "walk total minutes per week" domain of the IPAQ (N =71, r = -.23, p = .022, small to medium effect size). Another statistically significant relationship was observed between the limitations described by the WHODAS 2.0 were present over the last 30 days and of the WHODAS 2.0 and the "vigorous PA total minutes per week" domain of the IPAQ (N = 69, r = -.20, p = .043, small to medium effect size). Although not statistically significant, a negative association was observed between the number of days these limitations prevented the execution of usual activities or work due to their breast cancer, over the past 30 days, and the "vigorous PA total minutes per week" domain of the IPAQ (N = 71, r = -.19, p = .056, small to medium effect size). Negative associations also were observed between the limitations, described by the WHODAS 2.0 , that were present over the last 30 days (N =69, r = -.16, p = .088, small to medium effect size) and (N =71, r = -.18, p = .058, small to medium effect size), and the number of days these limitations completely prevented the execution of usual activities, or work, due to their breast cancer, over the past 30 days, and the "walk total minutes per week" domain of the IPAQ. The Table 6 has summarized the above results.

When associations between the three supplemental questions of the WHODAS 2.0 and the "all PA minutes per week" domain of the IPAQ were examined statistically significant ($p <$ .05) negative relationships were observed. A statistically significant negative relationship was

observed between the limitations cutting back or reducing usual activities or work because of their breast cancer over the past 30 days, not including the days limitations rendered them completely unable, and "all PA minutes per week" (N = 71, r = -.25, p =.017, small to medium effect size). Another statistically significant negative relationship was observed between the number of days these limitations, described by the WHODAS 2.0, were present over the last 30 days and "all PA minutes per week" domain of the IPAQ (N = 69, r = -.20, p = .049, small to medium effect size). Although not statistically significant, a negative association was observed between the number of days the limitations, described by the WHODAS 2.0, completely prevented the execution of usual activities, or work, due to their breast cancer over the past 30 days and the "all PA minutes per week" domain of the IPAQ (N = 71, r = -.15, p = .093, small to medium effect size). The Table 7 has summarized the above results.

CHAPTER FIVE

Discussion

Physical activity and community participation. Significant negative relationships were observed between the limitations experienced by breast cancer patients during daily activities, such as household chores, understanding and communicating, participation in society and walking along with moderate, and vigorous physical activity.

Understanding and communicating. A significant negative association between light physical activity, or "walking," and the limitations in "Understanding and Communicating" domain of the WHODAS 2.0 was observed (r = -.20, p = .046, small to medium effect size) (Table 4). This finding confirms our first hypothesis that engaging in physical activity reduces the limitations a breast cancer patient will encounter, specifically while concentrating, analyzing problems and finding solutions, learning, general understanding, and maintaining conversations. Past research has established an association between physical activity and increases in quality of life and the ability to increase their mental, physical, and social functioning (Phillips & McAuley, 2013).

Life activities. Another significant negative association was observed between "vigorous physical activity" and the limitations in the "Life Activities" domain of the WHODAS 2.0 (r = -.23, p = .023, small to medium effect size). Another significant negative association was observed between "walking" and the limitations in the "Life Activities" domain (r = -.23, p = .025, small to medium effect size) (Table 4). This also is in accordance with our first hypothesis. When the individual participates in some type of physical activity, a reduction in limitations in life activities occurs. If an individual participates even in light physical activity such as walking, there is a reduction in limitations experienced while doing household activities (Phillips &

McAuley, 2013). This includes taking care of household responsibilities, such as housework, in a quick and effective manner. The improvement in physical functioning has been observed after participation in various types of physical activity, more specifically with a focus on range of motion and muscle strength (Levy et al., 2012). When the patient engages in physical activity reduces the issues with fatigue; which, subsequently, allows the individual to complete more tasks efficiently (Phillips & McAuley, 2013).

Participate in society. Lastly, a significant negative association was observed between "walking" and the limitations in the "Participate in Society" domain of the WHODAS 2.0 (r = -.31, p = .004, medium effect size) (Table 4). This means that if an individual participates in light physical activity, the limitations in community participation decrease. Participation in society, more specifically looks at, barriers and hindrances experienced because of a specific health condition, in this case breast cancer. Emotional limitations, financial strain, issues experienced by family members, ability to relax are also addressed within this domain of the WHODAS 2.0. A more general question within the domain centers on issues participating in community activities like those who are not affected by health conditions.

Getting around. Significant negative associations were not observed within this domain when examined with the three types of physical activity. This domain focuses on the individual's ability to stand for long periods, move from sitting to standing, mobility in and out of the home, and walking long distances. Many individual's experience limitations in these areas for extended periods of time changing the individual's perception. They may have perceive that the amount of difficulty or limitations they experience are typical.

Self care. No significant negative associations were observed within this domain when examined with the three levels of physical activity. This domain focuses on functional abilities

such as the ability to maintain hygiene, eating, staying alone for a period of days, and the ability to dress independently. When the individual experiences limitations within this domain it is typically at the height of treatment. Some individuals may have aid in completing these activities changing their perception of difficulty. Eventually, the individuals are capable of completing these activities alone, which at that time, may seem like an improvement in self-care.

Getting along with others. Much like the previous two domains, no significant negative associations were observed when this domain was compared with the three levels of physical activity. Interpersonal relations are the focus of this domain, more specifically the ability to maintain and initiate friendships, interaction with new acquaintances, relationships within close relationships, and sexual activities.

Work. No significant negative associations were observed within this domain. This particular domain focuses on the individuals ability to participate in work and school efficiently. The individuals within our study were able to maintain employment during treatment. On the other hand, some individuals were in retirement, or were not in school, therefore this particular domain was not applicable.

Total minutes of physical activity and community participation. When evaluating the associations between the total minutes of physical activity per week and the seven subcategories of the WHODAS 2.0, several significant relationships were identified.

Life activities. A significant negative relationship between the sub-category limitations in "Life Activities" and total minutes of physical activity per week was observed (r = -.25, p = .015, small to medium effect size) (Table 5). This includes the total overall amount of time participating in all levels (walking, moderate, vigorous) of physical activity over the period of a week. Breast cancer survivors often encounter issues surrounding fatigue, making physical

activity difficult; however, encouraging them to simply move around may be the most effective way to keep them physically active.

Participate in society. Another significant negative relationship was observed between the sub category of the limitations in the "Participate in Society" and total minutes of physical activity per week (r = -.26, p = .013, small to medium effect size) (Table 5). Examining the limitations in participation in society with total minutes of physical activity per week is more comprehensive and, potentially, easier for an individual to estimate.

Supplemental questions. When the three subsequent questions of the WHODAS 2.0 (how many days limitations were present (H1), how many days the individual was totally unable to carry out daily activities (H2), and how many days activities were reduced by limitations (H3) were compared with the three levels of physical activity, two significant relationships were observed.

An association was discovered between the number of days, in the last 30 days, limitations were present and "vigorous physical activity" (r = -.20, p = .043, small to medium effect size) (Table 6). The more vigorous the activity, the less days these limitations in community participation were present within a 30 day period. When the limitations that resulted in a reduction of usual activities or work because of any health condition (not including the days they were totally unable to participate) were examined in relation to "walking physical activity," a significant negative association was observed (r = -.23, p = 0.22, small to medium effect size) (Table 6). When the individual engages in walking physical activity, the number of days the individual is required to reduce their activity decreases.

Supplemental Questions. When evaluating associations between the limitations in the subsequent three questions of the WHODAS 2.0 and total minutes of physical activity per week, significant negative associations were observed.

A significant negative relationship was seen between the number of days these limitations were present, over the last thirty days, and total minutes of physical activity per week (r = -.20, p = .049, small to medium effect size) (Table 7). The more time an individual engaged in physical activity, the fewer the number of days experiencing limitations in community participation were reported. Lastly, a significant negative relationship was observed between the limitations that resulted in a reduction of usual activities or work because of any health condition (not including the days they were totally unable to participate) and total minutes of physical activity per week (r = -.25, p = .017, small to medium effect size) (Table 7). It can be assumed that when an individual participates in physical activity, the number of days that activities had to be reduced decreased. These particular findings corroborated our first hypothesis.

Physical activity and limitations in community participation. During this study we expected to find that when an individual engages in physical activity, the limitations that occur during community participation, determined by the domains of the WHODAS 2.0, will decrease. We hypothesized that when examining the associations between the three levels of physical activity (IPAQ) and the limitations in community participation (WHODAS 2.0), stronger significant negative associations would occur in the limitations in the less physical domains of the WHODAS 2.0.

Life activities and understanding and communication. The results indicated that two significant negative associations were present in the limitations in the less physical domain "Life Activities" (r = -.23, p = .023*;* r = -.23, p = .025, small to medium effect size). Other significant

negative associations were seen in the limitations in the less physical domains "Understanding and Communicating" (r = -.20, p = .046, small to medium effect size) and "Participate in Society" (r = -.31, p = .004, medium to large effect size). The negative correlation between the limitations in the "Life Activities" and physical activities confirmed hypothesis one. However, the strongest negative association between the limitations in the "Communication and Understanding" and "Participation in Society" domain and physical activity did not confirm our second hypothesis. It was observed that the other limitations in the less physical domains of the WHODAS 2.0, "Getting Around," and "Self-care" did not correlate as strongly as predicted with physical activity.

Walking. An unexpected outcome was seen when looking at levels of physical activity from the IPAQ and the sub-categories of the WHODAS 2.0. Three significant negative relationships were observed in the "walk" level of physical activity (r = -.20, p = .046, small to medium effect size*;* r = -.23, p = .025, small to medium effect size*;* r = -.31, p= .004, medium to large effect size). No significant negative associations were observed within the "moderate" physical activity level. Only one significant negative relationship was revealed within the "vigorous" physical activity level (r = -.23, p = .023, small to medium effect size). This would suggest there can be a reduction in limitations experienced during some types community participation when a participant walks, or participates in light physical activities, but not necessarily for moderate or vigorous activity.

In addition to examining total minutes per week in each level of physical activity, an overall total minutes of physical activity per week was evaluated. When evaluating the total minutes of physical activity per week, the two strongest negative associations were observed within the limitations in the "Life Activities" (r = -.25, p =.015, small to medium effect size) and

the "Participate in Society" domain (r = -.26, p = 0.13, small to medium effect size). When the second hypothesis was applied to this comparison, the two strongest negative relationships were found: one in the physical domain and one in the less physical domain. It can be assumed that physical activity does not impact the physical domain of the WHODAS 2.0 as significantly as it does the less physical domain, strong negative correlations were observed in both domains of the WHODAS 2.0.

Implications. When breast cancer patients engage in any kind of physical activity, it helps them maintain self-efficacy and the ability to participant in daily activities (Phillips & McAuley, 2013). These daily activities can include running errands, walking around the household, communicating, and many other activities. This study suggests that when physical activity is recommended for breast cancer, a reduction of limitations experienced during community participation is observed. This finding confirms our first hypothesis: physical activity reduces community limitations. Our second hypothesis was not supported by this study. While it is uncertain, why some levels of physical activity, as measured in the IPAQ, effect select domains of the WHODAS 2.0. It was observed that the physical domains of the WHODAS 2.0 did not have stronger negative relationships with participation in physical activity when compared to the less physical domains. The strongest negative relationship was observed in the "Participate in Society" category, which was categorized in the less-physical domain.

Based on these findings, we believe that recommending that breast cancer patients/survivors participate in light physical activity will show results. We found that walking appears to be the most effective level of physical activity required to experience a reduction in these particular community limitations. Even though one significant negative relationship was observed within the "vigorous" physical activity level, participation in the lightest level of

physical activity rendered the most results. Recommendation of this type physical activity by a physician is ideal for breast cancer patients due to their limited ability to engage in physically taxing exercise as a result of the side-effects of treatment. This type of physical activity could be recommended through various exercise classes, or individual exercise plans. A recommendation to see a Rehabilitation Counselor may also be an effective treatment to increase motivation and establish a physical activity plan. These counselors can help the individual identify possible barriers at home, work, and within the community. The counselors can also help motivate these individuals, using behavioral techniques such as activity schedules to plan specific activities into their day at times they will be likely to follow through. The counselor can evaluate with the patient what physical activities work and which ones do not.

It is interesting to note that the limitations in the "Participating in Society" and "Communicating and Understanding" domains are particularly well matched with physical activity, whereas the limitations in the "Getting Along with Others" and "Work" domains are not. Many additional factors exist when considering returning to work that may explain why this particular domain is not significantly correlated. Many breast cancer patients/survivors may be on unemployment or social security disability. These programs are often incentives for the individual not to return to work, despite how well the individual may be recovering or their actual ability to work. It can be assumed that participation in physical activity increases the individual's self efficacy including social, emotional, social, and functional wellbeing, which contributes to greater participation in society (Phillips & McAuley, 2013).

Breast cancer patients can slowly begin to incorporate light physical activity into their daily routine by completing daily activities with light lifting and short distance walking around the home. A good example of this is cleaning the house, cooking, or light gardening. The

supervising physician could advise a slow progression to long distance walking and moderate resistance training. Participation in community exercise programs, such as yoga and Pilates, would also be good alternatives. As individuals increase their level of participation in physical activity, they will likely experience a reduction in limitations experienced during participation in community activities. Additionally, an increase in physical activity will also reduce the possibility of developing secondary health conditions such as high blood pressure, high cholesterol, diabetes, and obesity.

Limitations. One of the most significant limitations of the study is a lack of diversity among the recruited participants. The participants were collected from the Simmons Cancer Center at the University of Texas Southwestern Medical Center. No other recruiting sites were pursued. Collection of data from participants meeting the criteria was difficult due to the rate at which the individuals were being diagnosed and referred to the study. Finding a convenient time and location in which to administer or distribute the questionnaires was another limitation experienced during this study. Many participants did not live near the cancer center; therefore, the majority of the questionnaires were administered via the postal service. In addition, the majority of the participants were European American, limiting the ethnic diversity of the study sample. This is not representative of all ethnic, culture, and socioeconomic backgrounds, although it specifically represents the population receiving care at the Simmons Cancer Center. Another limitation experienced with this study was the functional and working status of the individuals within the study. It was reported by Feuerstein (2007) that 18.2 percent of cancer survivors were employed post-treatment; however, in our study 52% of participants were employed full time. This indicates that our participants suffered less functional impairment.

This factor may also suggest that our population is not representative of all breast cancer populations.

Within the measures utilized some limitations occurred. Within the IPAQ questionnaire, external factors were not specified. The individual could have recently undergone surgery, or started a new round of chemo/radiation/hormone therapy, reducing their ability to participate in physical activity at the time of the survey completion. These treatments may drastically reduce the participants' physical activity level for an unknown period. The individuals may also suffer from an unrelated physical condition such as joint issues, or other musculoskeletal problems. Location may also influence the participants ability to participate in physical activity. If the individual lacks access to adequate equipment or space to participate in physical activity the individual's IPAQ scores may reflect this. When examining the WHODAS 2.0, various domains have limitations. When considering the "Concentration and Communication" category the individual may suffer from an unrelated neurological or cognitive disorder affecting the responses of the individual. In the category "getting around," unrelated physical issues may influence the participant's responses. Taminga, de Boer, Verbeek, and Frings-Dressen (2012) reports individuals "felt difficulties in household tasks," like laundry and lifting heavy loads. "Life activities" may be limited due to the individual utilization of outside help completing household tasks due to these difficulties. If the individual was retired or unemployed limitations may be encountered in the "Work" category of the WHODAS 2.0.

Suggestions for future research. We discovered that participating in physical activity decreases some limitations experienced during community participation. The strongest relationship was observed between physical activity and "Life Activities" such as household chores and activities. These types of activities are part of day to day living for many individuals.

Therefore, if a breast cancer patient participates in physical activity there is a decreased likelihood of difficulty completing "Life Activities." Another worthy suggestion is to examine how many minutes, or hours, of various levels of physical activity are required over a pro-longed period of time to experience a significant relationship with each domain of the WHODAS 2.0. For example, would an hour a week for two months of vigorous activity create a significant negative relationship with the domain "Getting Around" of the WHODAS 2.0; similarly, would three hours of walking per week for two months create a significant negative relationship with the "Getting Along with Others" category of the WHODAS 2.0. Lastly, a preference in type, intensity, and frequency of interactions may limit the affect of physical activity on interpersonal domains of the WHODAS 2.0. The more introverted individuals may higher on these domains interfering with the results of the study.

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Table 1

Demographics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	70	30	64	51.81	7.88
Total	70				
BMI	73	16.30	44.81	27.29	5.36
Unknown	2				
Total	73				
Years Since Breast Cancer Onset					
Years	68	0.0	9.0	1.86	1.37
Total	68				
BMI Weight Status			**Frequency**	**Percent**	
Underweight			1	1.3	
Normal			25	33.3	
Overweight			31	41.3	
Obese			16	21.3	
Total			73	97.3	
Unknown			2	2.7	
Total			75	100.0	
Ethnicity/Race					
European American			34	45.3	
Native American			3	4.0	
Latino American			5	6.7	
African American			13	17.3	
Asian American			2	2.7	
Total			57	76.0	
Unknown			18	24.0	
Total			75	100.0	
Education					
Some High School			1	1.3	
High School Graduate			7	9.3	
Some College			16	21.3	
College Graduate			30	40.0	
Graduate School			20	26.7	
Total			74	98.7	
Unknown			1	1.3	
Total			75	100.0	

Table 1

Demographics-Continued

	Frequency	Percent
Vocation Status		
Unemployed	12	16.0
Retired	4	5.3
Employed Full-time	39	52.0
Employed Part-time	13	17.3
Volunteer Part-Time	2	2.7
Total	70	93.3
Unknown	5	6.7
Total	75	100.0
Breast Cancer Stages		
Stage I	16	21.3
Stage II	37	49.3
Stage III	15	20.0
Total	68	90.7
Unknown	7	9.3
Total	75	100.0
Treatment Status - Chemo		
Start to Receive Chemotherapy	1	1.3
In Chemotherapy	9	12.0
Completed Chemotherapy after 4 months to 5 years	63	84.0
Total	73	97.3
Missing	2	2.7
Total	75	100
Current and Past 12 months Relationship Status		
Never Married	9	12.0
Married	49	65.3
Widowed	2	2.7
Divorced	11	14.7
Co-habitating	1	1.3
Total	72	96.0
Unknown	3	4.0
Total	75	100.0

Table 1

Demographics – Continued.

	Frequency	Percent
Current Health Issues		
None (1)	22	29.3
Overweight (2)	1	1.3
High Blood Pressure (4)	5	6.6
High Cholesterol (5)	9	12.0
Diabetes (6)	4	5.3
1,4	1	1.3
2,4,5	2	2.7
4,5	2	2.7
4,5,6	1	1.3
Unknown	28	37.5
Total	75	100.0

Table 2

Descriptive Analysis of Physical Activity (N= 75)

	Minimum	Maximum	Mean	Std. Deviation
IPAQ Vigorous PA Total Minutes per week	.00	1800.00	136.00	290.09
IPAQ Moderate PA Total Minutes per week	.00	2880.00	166.33	388.58
IPAQ Walk Total Minutes per week	.00	3570.00	560.43	806.50

Table 3

Descriptive Analysis of Community Participation

	Minimum	Maximum	Mean	Std. Deviation
WHODAS total subscore of Understanding and Communication	.00	19.00	2.34	3.57
WHODAS total subscore of Getting Around	.00	13.00	2.67	3.04
WHODAS total subscore of Self Care	.00	8.00	.77	1.87
WHODAS total subscore of Getting Along with others	.00	15.00	1.73	2.59
WHODAS total subscore of life activities	.00	14.00	2.91	3.51
WHODAS total subscore of Work*	.00	12.00	2.19	2.71
WHODAS total subscore of Participate In Society	.00	25.00	6.72	5.24
H1. Overall, in the past 30 days, how many days were these difficulties present?	0	30	9.57	11.16
H2. In the past 30 days, for how many days were you totally unable to carry out your usual activities or work because of any health condition?	0	30	2.99	6.63
H3. In the past 30 days, not counting the days that you were totally unable, for how many days did you cut back or reduce your usual activities or work because of any health condition?	0	30	6.34	8.94

Note. * Only participants who were at work.

Table 4

Correlations of Each Physical Activity and Each Category of Community Participation

		IPAQ Vigorous PA Total Minutes per week	IPAQ Moderate PA Total Minutes per week	IPAQ Walk Total Minutes per week
IPAQ Vigorous PA Total Minutes per week	*r*			
	p			
IPAQ Moderate PA Total Minutes per week	*r*	.47**		
	p	.000		
IPAQ Walk Total Minutes per week	*r*	.39**	.44**	
	p	.000	.000	
WHODAS total subscore of Understanding and communicating	*r*	-.13	-.08	-.20*
	p	.136	.246	.046
WHODAS total subscore of Getting Around	*r*	-.11	-.15	-.10
	p	.163	.096	.179
WHODAS total subscore of Self Care	*r*	-.14	.-.10	-.16
	p	.114	.191	.086
WHODAS total subscore of Getting Along With Others	*r*	-.11	-.08	-.18
	p	.174	.256	.074
WHODAS total subscore of Life Activities	*r*	-.23*	-.14	-.23*
	p	.023	.108	.025
WHODAS total subscore of Work**	*r*	-.10	-.08	-.04
	p	.219	.263	.364
WHODAS total subscore of Participate in Society	*r*	-.05	-.17	-.31**
	p	.337	.072	.004

Note. * $p < .05$. ** $p < .01$. ** Only participants who were at work.

Table 5

Correlations of Total Physical Activity and Each Total Category of Community Participation

		IPAQ All PA Minutes Per Week
WHODAS total subscore of Understanding and Communicating	*r*	-.19
	p	.055
WHODAS total subscore of Getting Around	*r*	-.15
	p	.102
WHODAS total subscore of Self Care	*r*	-.17
	p	.068
WHODAS total subscore of Getting Along with Others	*r*	-.17
	p	.081
WHODAS total subscore of Life Activities	*r*	-.25*
	p	.015
WHODAS total subscore of Work**	*r*	-.08
	p	.270
WHODAS total subscore of Participate In Society	*r*	-.26*
	p	.013

Note. *$p < .05$. **$p < .01$.

** Only participants who were at work.

Table 6

Correlation of Each Physical Activity and Three Overall Evaluations of Community Participation

		IPAQ Vigorous PA Total Minutes per week	IPAQ Moderate PA Total Minutes per week	IPAQ Walk Total Minutes per week
IPAQ Vigorous PA Total Minutes per week	*r*	1		
	p			
IPAQ Moderate PA Total Minutes per week	*r*	.47**	1	.44**
	p	.000		.000
IPAQ Walk Total Minutes per week	*r*	.39**	.44**	1
	p	.000	.000	
H1. Overall, in the past 30 days, how many days were these difficulties present?	*r*	-.20*	-.13	-.16
	p	.043	.137	.088
H2. In the past 30 days, for how many days were you totally unable to carry out your usual activities or work because of any health condition?	*r*	-.04	-.074	-.188
	p	.371	.270	.058
H3. In the past 30 days, not counting the days that you were totally unable, for how many days did you cut back or reduce your usual activities or work because of any health condition?	*r*	.37	.27	.05
	p	.056	.119	.022

Note. *$p < 0.5$. **$p < .01$.

Table 7

Correlations of Total Physical Activity and 3 Overall Evaluations of Community Participation

		IPAQ All PA Minutes Per Week
H1. Overall, in the past 30 days, how many days were these difficulties present?	*r*	-.20*
	p	.049
H2. In the past 30 days, for how many days were you totally unable to carry out your usual activities or work because of any health condition?	*r*	-.15
	p	.093
H3. In the past 30 days, not counting the days that you were totally unable, for how many days did you cut back or reduce your usual activities or work because of any health condition?	*r*	-.25*
	p	.017

Note. *p <.01. **p < .05.

BIOGRAPHICAL SKETCH

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EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional*

INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
Texas Tech University	B.A.	2008-2012	Psychology
The University of Texas Southwestern School of Health Professions	M.R.C.	2012-2015	Rehabilitation Counseling Psychology

Positions and Employment

2010-2011 Psychiatric Care Specialist at Canyon Lakes Residential Treatment Center

Clinical Experience

2013-2014 Developmental Neuropsychology Internship
2014-2014 Metrocare Services Internship

Presentations and Publications

2012 Batastini, A. B., Bolanos, A., Dean, T., Moor, K., Bewley, M., & Morgan, R. D. (2012, August). Employer Bias in Hiring Mentally Ill and Criminal Justice-Involved Applicants: The Impact of Education and Experience. Poster session presented at the annual American Psychological Association Convention, Orlando, Florida

Professional Memberships

2012 American Psychology-Law Society (Student Affliiate)
2012 American Psychological Association (Student Affiliate)
2013 International Association of Rehabilitation Professionals (Student Affiliate)