

PHYSICAL ACTIVITY AND BODY IMAGE IN BREAST CANCER SURVIVORS

By

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DEDICATION

This thesis is dedicated to my amazing and brilliant parents, Jim and Lila. You have provided me with wonderful guidance and prayers throughout everything I have ever done in my life. You have always given me unconditional love and support each and every day of my life. You have been with me through the good times, the bad times, the easy times, and the hard times. You have pushed me to always do my best with anything I have done. For all of this and so much more, I thank you and love you so much!!

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ABSTRACT

Jamie M. Beckham

PHYSICAL ACTIVITY AND BODY IMAGE IN BREAST CANCER SURVIVORS

This thesis is under the direction of Shannon L. Mihalko, Ph.D., Assistant Professor of Health and Exercise Science.

With earlier detection and improved treatment techniques for breast cancer, more women are surviving breast cancer only to be presented with the challenge of coping with negative physical and psychological adjustments. One major challenge breast cancer survivors face is a decreased body image. Women who undergo breast cancer surgery report a lower body image when compared to women without breast cancer surgery (Kraus, 1999). Research has shown that physical activity can facilitate better psychological outcomes, including improved body image in college-aged females (Fisher & Thompson, 1994). The present study examined the relationship between physical activity and body image in breast cancer survivors (M age = 63.3, SD = 7.3), as well as the mediational role of secondary variables of interest (body mass index, grip strength, and appearance self-efficacy) in the physical activity-body image relationship. Body image was operationalized as the anxiety an individual experiences when she feels her physique is being evaluated in a negative manner, or social physique anxiety (Hart, Leary, & Rejeski, 1989). Physical activity participation was inversely related to social physique anxiety (SPA; $r = -.457, p < .01$). However, the examined mechanisms were not significant mediators of the physical activity and social physique anxiety relationship. The relationship between physical activity and social physique anxiety demonstrates the role physical activity may play in decreasing body image disturbances in breast cancer survivors. Further, the physical activity-body image relationship should be an area of concentration in breast cancer survivors in an attempt to help increase breast cancer survivors' quality of life.

INTRODUCTION

Breast cancer is a leading form of cancer diagnosis in women (Engel, 1996). With the number of women diagnosed with breast cancer each year on the rise, more women are presented with the challenge of coping with the negative physical and psychological changes associated with the breast cancer experience. These changes occur despite the changes in surgery techniques to minimize the amount of breast tissue that is removed. One of the negative psychological changes many women experience after breast cancer treatment is a decrease in body image.

Body image has been defined as the picture an individual develops in their mind of how they believe they appear to others (Schilder, 1950). With the inconsistency of operational definitions of body image and the lack of a theoretical framework in the body image literature, the theory of self-presentation has been used to guide this examination. Body image is conceptualized in the current study as the evaluation of the picture a person develops in their head of how they envision they appear to others and can be operationalized as social physique anxiety, or the anxiety an individual experiences as a result of others negatively evaluating his or her body (Hart et al., 1989).

While body image concerns have been documented in women treated for breast cancer (King, Kenny, Shiell, Hall, & Boyages, 2000; Lindop & Cannon, 2000; Lindop & Cannon, 2001; Lindop et al., 2001), factors that improve body image in this population have not been extensively examined. One possible method of improving body image in breast cancer survivors is through participation in physical activity. Physical activity has been reported to improve psychological health including body image in other populations

(Eklund & Crawford, 1994; Loland, 1998; Zabinski, Calfas, Gehrman, Wilfey, & Sallis, 2001). While this relationship has not been directly examined in women who have survived breast cancer, studies have reported physical and psychological factors associated with both physical activity and body image to exist in the breast cancer survivor population (Winningham, MacVicar, Bondoc, Anderson, & Minton, 1989; Mock et al., 1994; Kolden et al., 2002).

In an effort to improve body image in the breast cancer survivor population, it is important to determine the factors associated with body image in this cohort. If physical activity is related to improvements in body image in women who have survived breast cancer, the findings could be used by healthcare professionals to develop better care after breast surgery for breast cancer survivors. Specifically, physical activity could be offered as part of the rehabilitation process for breast cancer. In addition, improved body image in breast cancer survivors may positively influence overall quality of life (King et al., 2000).

REVIEW OF LITERATURE

Breast Cancer

Breast cancer is a disease that causes cells in the breast tissue to change and divide uncontrolled. Untreated breast cancer can result in death. About 203,500 women will be diagnosed with invasive breast cancer in the United States in 2002. An additional 54,300 women will be diagnosed with in situ breast cancer. Of these new cases of breast cancer, only 39,600 deaths are predicted while 86% of women diagnosed with breast cancer are expected to survive for a minimum of five years. Prevalence rates are increasing and mortality rates are declining. This is most likely the result of improved detection and treatment practices (American Cancer Society, 2002). The increasing prevalence of breast cancer survivors results in a large number of women having to face the challenge of coping with the psychological and physical changes associated with breast cancer treatment. The objective of this study is to examine the body image implications associated with the breast cancer experience and to identify those factors that may play a role in body image among this population.

Anatomy of the Breast and Breast Cancer

A woman's breast has two functional (lobules and ducts) and several structural components (fat, connective tissue, blood vessels, and lymphatic channels; see Figure 1). It is often in the two functional elements that breast cancer first appears. The lobules are part of the milk-producing component, while the ducts carry milk to the nipple. The early form of breast cancer is called in situ cancer. In situ cancer occurs when the cancerous cells have not spread beyond the initial affected area. Ductal carcinoma in situ

(DCIS) is cancer that occurs in a woman's ducts and is more common than lobular carcinoma in situ (LCIS), cancer of the breast's lobes. In situ breast cancer becomes invasive as the cancerous cells spread and invade the surrounding fatty tissue (Engel, 1996).

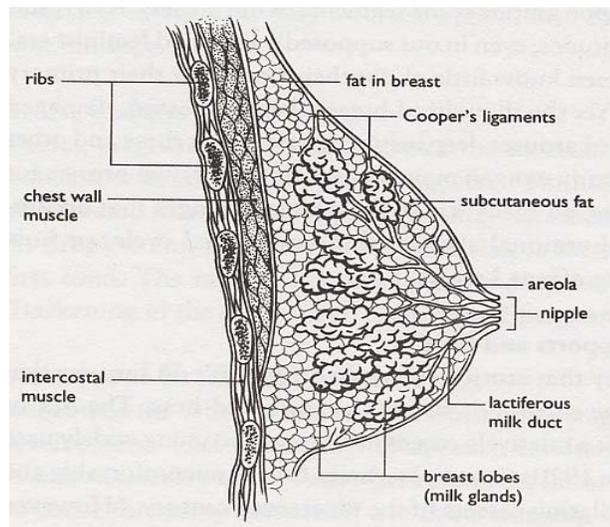


Figure 1: Structure of the Breast (Engel, 1996)

Breast Cancer Risk Factors

Although breast cancer can occur in any woman and not just in women with risk factors, the key risk factors for breast cancer include biological and lifestyle factors. Biological factors include increasing age, genetics, breast density, levels of female hormones, and the length of menstrual period (American Cancer Society, 2002; Engel, 1996). As a woman's age increases, her risk for breast cancer increases. The majority (76%) of all breast cancer cases occur in women 50 years of age and older (Centers for Disease Control and Prevention & President's Council on Physical Fitness and Sports, 2000). A woman is twice as likely to develop breast cancer if one or more of her first-degree relatives have been diagnosed with breast cancer. The risk increases as the number of relatives with breast cancer increases. The more dense a woman's breast

tissue is, the higher her chance for breast cancer. It is speculated that “dense breast tissue may contain extra-abundant growth factors that stimulate cancer formation” (Engel, 1996). Evidence shows that increased exposure to hormones, such as estrogen and progesterone, have an influential role in the development of breast cancer. This is most likely due to the fact that these hormones cause cell division. The length of a woman’s menstrual period follows the same principle. The earlier a woman begins her menstrual cycle and the later the cycle ends, the longer a woman’s body is subjected to the fluctuation in female hormones, which leads to an increased risk for developing breast cancer (Engel, 1996).

While most biological risk factors are unmodifiable, there are several lifestyle factors that can be modified, including diet, alcohol intake, age when bearing the first child or having no children, use of oral contraceptives, and physical activity levels (American Cancer Society, 2002; Engel, 1996). Diets containing a large amount of calories and saturated fats seem to increase the probability of breast cancer as evidenced by elevated cancer incidence in animals on high-fat diets (Engel, 1996). Drinking moderate amounts of alcohol elevates a woman’s chance for breast cancer. The mechanism thought to cause this increased risk for breast cancer is from alcohol-related changes in estrogen levels. The two other factors that influence estrogen levels are a woman’s age at first childbearing and estrogen-containing birth control pills (Engel, 1996). Having no children or the first child after the age of 30 increases the bodies exposure to the cycling of hormones as does estrogen-containing oral contraceptives. Physical inactivity is also linked with breast cancer risk. Increased amounts of physical activity and maintaining a healthy body composition are linked to decreasing a woman’s

risk for breast cancer. Recent studies have concluded that physical activity before puberty and during adolescence plays a key role in decreasing risk of developing breast cancer (Engel, 1996).

Breast Cancer Treatments

There are several surgical treatments (breast conserving, sentinel node biopsy, and mastectomies) along with several adjuvant therapies (radiation, hormonal, and chemotherapy) utilized to treat breast cancer (American Cancer Society, 1997a; American Cancer Society, 1997b; Olivotto, Gelmon, & Kuusk, 2001a; Olivotto, Gelmon, & Kuusk, 2001b; Engel, 1996; Link, 1998). Treatment for breast cancer often depends upon the stage of the breast tumor. Breast conserving techniques attempt to remove the cancerous cells while leaving the breast to look as normal as possible. The earlier the tumor is detected, the more often a breast conserving surgical technique can be utilized. As the breast tumor stage advances, the less breast conserving surgical techniques can be used and the more radical surgical techniques must be used. In these circumstances, radiation is used to reduce the size of the breast tumor so a more breast conserving technique can be used to remove the tumor.

Surgical Treatments. The two types of breast conserving surgery are a lumpectomy and a partial mastectomy. A true lumpectomy removes only the breast tumor and all other tissue is left alone (Olivotto et al., 2001b). Very rarely does this operation occur. Cancer cells usually spread microscopic tentacles into normal tissue, which can cause breast cancer to reoccur if left behind during a lumpectomy. This can be prevented by removing the normal breast tissue surrounding the tumor. Removing normal tissue along with the tumor is considered a partial mastectomy. This technique is sometimes referred to as a

lumpectomy and is the more common form of surgery performed today. While mastectomy is part of the name, a partial mastectomy is still a breast conserving technique. Other types of partial mastectomies are more commonly known as wide local excisions and quadrantectomies. Wide local excisions remove slightly more normal breast tissue than partial mastectomies and quadrantectomies remove a quarter of the breast tissue and skin.

In addition to removal of the tumor and normal tissue, surgeons may remove lymph nodes from under the armpit. This is known as an axillary dissection. Axillary dissections give surgeons the ability to examine the nodes to determine the stage of the tumor and the extent to which it has migrated to other areas of the body. Most breast conserving surgeries are followed with radiation therapy to provide these individuals with survival rates similar to a modified radical mastectomy. While some of the breast is conserved with breast conserving techniques, the remaining breast tissue can be deformed. As a result, the breast cancer survivor may be more conscious of certain clothes she wears and how she appears to others than a woman who has not received breast cancer treatment.

Sentinel node biopsy is a fairly new technique and is used in conjunction with a breast conserving surgical technique. The sentinel node biopsy requires the surgeon to inject a radioactive blue dye, such as technetium, into the cancer site. The dye then migrates into the lymph nodes. The dye typically concentrates into the first few lymph nodes above the cancerous tumor. These nodes are then removed and analyzed to determine the extent of cancer involvement to the nodes. Axillary node dissections are

sometimes performed after a sentinel node biopsy in those patients where the biopsy of the sentinel node is abnormal.

A more dramatic surgical technique, the mastectomy, involves removing the entire breast, without conserving any breast tissue. A simple or total mastectomy requires the surgeon to remove the entire breast without removal of any surrounding musculature or the axillary nodes. While this technique may require removal of some of the skin and the nipple, sometimes a small incision can be made in the breast so abnormal tissue can be removed while preserving the skin and nipple. Women that have their breast removed for prophylactic reasons usually have a simple or subcutaneous mastectomy in order to preserve as much surrounding tissue as possible.

A modified radical mastectomy is a slightly more dramatic surgical technique than the two previously mentioned mastectomies. A modified radical mastectomy requires complete removal of the breast. The axillary nodes, the nipple and some skin are also surgically removed. This technique entails an incision to be made across the breast resulting in a long scar across the chest. The earliest mastectomy performed, which is rarely performed today, is the radical mastectomy. A radical mastectomy removes the entire breast, pectoralis muscles, some nerves, the nipple, skin, and all lymph nodes in the surrounding area. Women treated with mastectomy face the challenge of body image disturbances, as part of their femininity, the breast, has been partially or completely removed. Curran et al. (1998) reported that the women who underwent a breast conserving therapy had significantly better body image and satisfaction with their treatment than the women who received a mastectomy.

Breast Reconstruction. Breast reconstruction is a common option for women undergoing a mastectomy. Breast reconstruction can occur at the time of the mastectomy or it can be delayed. Reconstruction is cited to be most commonly performed because women have “the psychological desire to feel ‘whole’ again” and surgeons want to “restore self-image, self-confidence and improve quality of life” (Clugston & Warren, 2001). There are several reconstruction options after breast cancer surgery. The less demanding reconstruction technique is to insert an implant at the site of the breast removal. This technique can only be performed if the patient has enough tissue at the site of the mastectomy to cover the implant and match the contralateral breast. The pectoralis muscle is also required, so this technique cannot be used for patients who receive a radical mastectomy.

A second form of reconstruction is the use of a tissue expander. A tissue expander is placed under the pectoralis muscle and inflated periodically with salt water. By inflating the expander, the skin is stretched as if a breast was growing underneath. Once the skin is expanded adequately, the expander is removed and a breast implant is put in its place. This technique is more appropriate for women without enough skin at the time of the breast cancer surgery but disadvantageous because it requires two surgeries.

The last reconstruction technique uses myocutaneous flaps. In other words, skin, fat, and muscle are relocated from one area of the body to the chest area. This helps create a more natural feeling breast but can cause complications at the donor site. One donor site is the latissimus dorsi muscle. This large back muscle is wrapped around from the back and put into place at the mastectomy site. A small implant can be used in

conjunction to create the desired breast size. Unfortunately, this surgery leaves the patient with a scar, back deformity, and eliminates the use of the latissimus dorsi as a back muscle. The transverse rectus abdominus muscle flap (TRAM flap) is the other muscle commonly used. This technique uses the skin and fat from the lower belly along with a portion of the transverse rectus muscle. The tissue is pulled up to the site of the mastectomy and used to create a new breast. The TRAM flap usually results in a longer recovery period. About four to six months after breast reconstruction, the patients are scheduled for the second stage of reconstruction. At this time, symmetry between the breasts is attempted and a nipple is created for the reconstructed breast.

While breast reconstruction offers breast cancer survivors the chance to appear 'whole' to others, body image problems may still occur. These problems usually stem from the reconstructed breast not feeling or looking the same as the untreated breast. Ganz et al. (1998) reported that a mastectomy with reconstruction led to better body image than a mastectomy with no reconstruction. In comparison, the women treated with a breast conserving technique reported the highest satisfaction with their bodies.

Adjuvant Therapy. Adjuvant therapy is therapy that is performed in addition to a surgical technique. Radiation therapy, also called radiotherapy, kills cancerous cells while only causing minimal damage to normal cells (American Cancer Society, 1997b). High-energy x-rays, electron beams, or radioactive isotopes are used to reduce the size of the tumor or eliminate the cancerous growths. Radiation affects the mitotic stage of the cell's life cycle, preventing the cells from dividing further. Unlike chemotherapy, which will be discussed later, radiation does not affect the whole body. Radiation only treats the area it is directed to, usually the tumor and some surrounding tissue. Normally,

radiation therapy is received five days a week for up to eight weeks. Radiation therapy is sometimes used as the first form of treatment, or neoadjuvant therapy, in advanced stages of breast cancer.

Radiation can have several side effects on the breast cancer survivor (American Cancer Society, 1997b). One of the most common side effects for a woman receiving radiation therapy is fatigue. The amount of fatigue usually increases as the number of radiation treatments increase and peaks around the third and fifth weeks. Women may lose their appetite while undergoing radiation. The actual cause of this is unknown, but it is important not to succumb to the loss of hunger because the energy required for normal tissue repair comes from the food a breast cancer survivor eats. Radiation can also cause local skin reactions by causing the area to become dry, red, and itchy. While radiation therapy is beneficial in preventing cancer reoccurrence, it can negatively add to the emotions a woman faces from breast cancer treatment. It is important for women to realize most side effects from radiation withdraw after treatment ceases.

Chemotherapy is another adjuvant therapy that survivors of breast cancer may receive to help reduce the risk of reoccurrence (American Cancer Society, 1997a). Chemotherapy uses systemic drugs to treat cancerous cells that have migrated beyond the original site of infection. Unlike radiation, chemotherapy cannot be directed toward a specific body area. Chemotherapy drugs attempt to stop a cancerous cell at three stages: 1) the production of genetic material, 2) cell division, or 3) the resting stage. There are five classes of chemotherapy drugs: alkylating agents, antibiotics, antimetabolites, plant alkaloids, and hormones. Chemotherapy drugs are designed to stop cell division (alkylating agents, plant alkaloids, hormones), prevent cell reproduction (antitumor

antibiotics), or mimic cell nutrients (antimetabolites). Chemotherapy is administered in cycles. One cycle usually destroys a certain percentage of cancerous cells. During the rest between cycles, the cancerous cells continue to divide, but are then reduced even further by the next cycle of chemotherapy.

Chemotherapy has several side effects and can harm normal tissues that divide rapidly (American Cancer Society, 1997a). The most common side effects are nausea and vomiting. This normally occurs because the chemoreceptor trigger zone is stimulated by some chemotherapy drugs. Nausea and vomiting usually only last for a short period. Nausea may even result from the woman knowing that she is going in for chemotherapy treatment. Diarrhea and mouth sores are two other side effects. Both of these occur when chemotherapy drugs irritate the lining of the intestines and mouth. Chemotherapy patients may also feel fatigued. This is usually due to anemia, or smaller amounts of red blood cells that provide tissues with oxygen. The reduction in red blood cells stem from the negative effect that drugs have on patients' bone marrow, which produces red and white blood cells and platelets. Chemotherapy drugs also affect a woman's ovaries. This can cause her menstrual cycles to change or even stop. The cessation of menstrual cycles results in a woman feeling menopause-like symptoms. Usually the menstrual cycle returns upon the end of the chemotherapy treatment, but menopause can be permanent. This can cause severe emotional distress in women still wanting to bear children.

One of the most feared side effects from chemotherapy is hair loss. The drugs used for chemotherapy affect rapidly dividing cells, including hair follicle cells. This can cause a woman's hair to fall out during chemotherapy, which can be very distressing to

the patient because it infringes on the image of a healthy appearance. For much of society, a woman without any hair portrays a sickly person (American Cancer Society, 1997a). Although many women who lose their hair to chemotherapy find ways to conceal their loss from the outside world through scarves and wigs, hair loss may decrease the satisfaction a woman has with her body (Wilmoth & Sanders, 2001). Women undergoing chemotherapy may also gain weight during their treatment. The average weight gain is between six and eight pounds although a gain of more is not unusual (American Cancer Society, 1997a). With the emphasis society places on having a lean, healthy body, a woman who gains weight while on chemotherapy may also have body image disturbances (Demark-Wahnefried, Winer, & Rimer, 1993).

The last form of adjuvant therapy is hormonal therapy. Hormonal therapy is used to reduce the amount of hormones circulating through the entire body, mainly estrogen and progesterone. Pathology examinations of the breast tissue that is removed during the breast cancer surgery are used to determine whether a woman is positive or negative for estrogen receptor sites. Tamoxifen is the key drug utilized to block estrogen receptors, since there are no other hormonal treatments shown to be as effective as tamoxifen at this time. Thus, hormone therapy is most beneficial for a woman with more positive estrogen receptor sites than a woman with few positive or negative estrogen receptor sites. Tamoxifen is taken orally, lending it to be the most convenient adjuvant therapy after breast cancer surgery. While tamoxifen is convenient, the side effects of tamoxifen result from hormonal changes and usually cause a woman to be put into menopause (Link, 1998). This frank menopause may cause the breast cancer survivor to feel less feminine

and less satisfied with her body as a result of losing her menstrual cycle and facing bodily changes at an earlier age than normal.

With the multiple options and advances in treatment for breast cancer, more women are able to survive breast cancer today than in the past. Surgical treatments provide several options to help treat breast cancer, and the addition of adjuvant therapy can greatly reduce the risk of reoccurrence. While death from breast cancer has been reduced over recent years, more women are faced with changes in their body image as a result of breast cancer surgery and adjuvant therapy. While breast conserving techniques offer women with breast cancer a chance to preserve some of their breast tissue and decrease major alterations to the actual body, mastectomies increase the amount of breast tissue removed as well as increasing alterations to the body. The many direct and indirect effects of breast cancer surgery and therapies increase the risk for body image alterations.

Body Image

The concept of body image has been examined in the literature since the 1950's (Schilder, 1950). Schilder (1950) considered body image to consist of three major components: 1) the physiological structure, 2) the libidinous structure, and 3) the sociological structure. The physiological component deals with the physical body in space. It is in this dimension that, "an active construction of the image of the body takes place" (Schilder, 1950). In other words, the perception of the body is formed. The libidinous element is the sexual desires of body image. Changes in the libidinous component can alter the perception of the body, on both the physical surface and the inner aspect, thus changing the body image. The relationship of personal body image to other body images is the sociological structure. Being social with others provides a basis

of creating an identity from the association of others' body images. Schilder (1950) defined body image as "the picture of our own body which we form in our mind." While the term 'body image' has been used to describe the construct of 'self image,' body image related to the evaluation of one's physical appearance will be the focus of this paper.

Cash has more recently (1986; 1985) continued the work in the area of body image. His area of concentration in body image research has mainly focused on appearance and physical attractiveness, defining body image as "the concern with the internal, subjective representations of physical appearance and bodily experience" (Cash & Pruzinsky, 1990). In 1986, Cash et al. conducted a comprehensive review of the body image literature. At the conclusion of this review, the researchers reported that women were more concerned and less satisfied with their bodies than men, and a majority of men and women were unhappy with their weight. This survey also reported that younger men and women who were in their teens and twenties were more concerned with how they appeared to others than older men and women, except for those over the age of sixty. Men and women over the age of sixty were also more concerned with their appearance. Cash and his colleagues (Noles, Cash, & Winstead, 1985) also determined that depressed people are more likely to find themselves physically unattractive and are less satisfied with their bodies than people who are not depressed.

Upon review of this literature, it is clear that there is an inconsistency in the definition of body image, and thus difficulties when comparing the literature. Some of the literature concentrates on body image as an objective measurement or an individual's ability to accurately determine the size of his or her body or body parts. Other literature

focuses on body image as a subjective measurement or how an individual feels about his or her body. Some of the differences in the definition of body image can be seen in the work of Schilder and Cash. Although the two researchers take somewhat differing views when defining body image, by combining the concepts of Schilder and Cash, a working definition of body image can be formed. Thus in this study, body image will be operationally defined as the evaluation of the picture a person develops in their head of how they envision they appear to others.

Body Image Research

Body image research has focused mostly on body image disturbances in women with eating disorders (Ackard, Croll, & Kearney-Cooke, 2002; Thompson, Covert, & Stormer, 1999; Cash & Deagle, 1997; Sands, Tricker, Sherman, Armatas, & Maschette, 1997; Davis, 1992; McDonald & Thompson, 1992). McDonald and Thompson (1992) studied 191 men and women in an examination of the relationship between eating disturbance and body dissatisfaction. The results showed that females were more dissatisfied with their bodies and had a higher incidence of eating disturbances than males. Barry and Grilo's (2002) results concur with past body image and eating disturbance literature. They reported that a significantly higher number of females compared to males have body image and eating disturbances. Barry and Grilo (2002) state that Caucasian females report significantly more body image disturbances in comparison to African American and Latino American females. Rucker and Cash (1992) studied the relationship of body image and eating behaviors in African American and Caucasian college students. This study concluded that Caucasian college students had poorer attitudes on body image when compared to African American students. The study

also reported that Caucasian college students restrained their eating habits more often than did African American college students. These studies illustrate that more women are faced with body image disturbances than males, and that Caucasian women face body image disturbances more than other races.

Although studying women with disordered eating habits is important, there are other female populations facing body image concerns that should be examined. One such population is women that have survived breast cancer. Women who undergo surgical treatments to free themselves of breast cancer face the challenges posed by an altered body, thus an altered body image. The resultant change in the breast tissue may significantly influence body image because today's society places an emphasis on women having perfect bodies, which includes perfect breasts. While breast-conserving surgery helps preserve the breast tissue, women who undergo breast-conserving surgery are still left with a partial breast in comparison to the unaffected breast. This can distort a woman's body image. Women who undergo breast cancer surgery are also faced with side effects from adjuvant therapy that can alter the survivor's body image. As the success of survival after surgery increases, more women are faced with the changes associated with these physique-altering treatments.

Body Image and Breast Cancer

There have been many comparisons of body image concerns between women who have received a breast conserving technique (a lumpectomy or wide local excision), a modified radical mastectomy, and a modified radical mastectomy with breast reconstruction (Steinberg, Julian, & Wise, 1985; Schover, 1991; Schover, 1994; King et al., 2000; Lindop et al., 2001; Ganz, Rowland, Meyerowitz, & Desmond, 1998).

Shimozuma et al. (1999) recruited 227 women to participate in a prospective longitudinal study. During the study, information was collected from the participants through interviews and clinical evaluations. Body image disturbances were greater in those women who were treated with a mastectomy as compared to those women treated with a breast conserving technique. One month following their surgery, 67% of the women who received a mastectomy were found to be “uncomfortable with body changes” compared to only 41.3% of the women who received a breast conserving technique. A year later, 54.8% of the mastectomy patients and only 38.0% of the breast conserving technique patients were uncomfortable with changes. When looking at the embarrassment survivors experienced in showing others their body, 57.8% of mastectomy and 34.7% of breast conserving technique patients were embarrassed at one month, and 43.7% of mastectomy and 23.9% of breast conserving technique patients were still embarrassed one year later.

Yurek, Farrar, and Anderson (2000) reported that those subjects who underwent a lumpectomy faced less body change stress than women with a modified radical mastectomy with breast reconstruction or just a modified radical mastectomy. The lowest level of traumatic body change stress (as demonstrated by the mean score), characterized by responses of intrusion and avoidance, was experienced by the lumpectomy patients (17.86) followed by the modified radical mastectomy patients (31.36) and the modified radical mastectomy with breast reconstruction patients (32.71). As with the previous findings, women undergoing a modified radical mastectomy had the greatest body dissatisfaction (36.39) after breast cancer surgery. These findings suggest

that women consider the removal of their breast to significantly change the look of their body in a negative way.

Al-Ghazal, Fallowfield, and Blamey (2000) examined 577 women after their surgical breast treatment. The experimenters separated the results into four different age groups (Group 1= 20-39 years, Group 2= 40-49 years, Group 3= 50-59 years, Group 4= 60-70 years). Body image (as demonstrated by the mean score) was significantly better in the wide local excision participants than the simple mastectomy or the simple mastectomy with breast reconstruction participants. The greatest satisfaction with body image was observed in Group 1 of the wide local excision (19.4) group as compared with Groups 2, 3, and 4 (62.8, 59.4, and 40.0, respectively). The worst body image was in Group 3 participants that received a simple mastectomy (143.9) compared to Groups 1, 2, and 4 (47.1, 140.1, and 103.2, respectively). This cross-sectional study suggests that women of different ages face body image issues after breast cancer surgery, with women between 40 and 59 years of age appearing to have the greatest body image trouble after breast cancer surgery.

Surgical techniques to treat breast cancer have improved the opportunity for women to conserve their breast, yet for some women, a mastectomy is the only way to treat their cancer. Even reconstruction does not always offer protection from body image disturbances. In review of this literature, however, it is difficult to draw many conclusions due to poor and inconsistent definitions of the body image concept. Further, there has been a lack of a theoretical framework in the body image and breast cancer research. There are several frameworks that could offer an explanation as to why women's body image decreases after surgical breast treatment. One theoretical

framework that has been consistently supported in the literature is the self-presentation theory.

Self-Presentation

Self-Presentation Theory

Interest in self-presentation had its beginnings in the late 1950's (Goffman, 1959). Goffman (1959) originally proposed the idea of self-presentation, also known as impression management, as an individual trying to control the impressions others form from the actions and expressions he or she gives. He proposed that managing your impressions consisted of two different activities, verbal and physical actions. Verbal symbols vocally present others with specific information, while actions illustrate information. The verbal symbols and actions do not always match, causing conflict. Goffman (1959) further states that an "individual's initial projection commits him to what he is proposing to be and requires him to drop all pretenses of being other things." In other words, first impressions are important.

Jones (1964) continued Goffman's idea of impression management and pursued the area of ingratiation. Ingratiation is a type of self-presentation. Jones (1964) defines ingratiation as "a class of strategic behaviors illicitly designed to influence a particular other person concerning the attractiveness of one's personal qualities." In other words, he believes that people present themselves in ways that will result in favorable judgments being formed about them by taking a person's private emotions and exercising them as public actions. These actions help form a person's identity.

Schlenker (1980), in line with Goffman and Jones, affirmed that, “people are social animals.” People attempt to control practically every action they make, both consciously and unconsciously, in order to make a certain impression for others. In addition, he established that the actions people participate in must establish a pattern in order for people to be consistent with how others view them. Furthermore, managing our images is essential to individuals’ social life identities. Schlenker (1980) acknowledged that “identities define who we are: they shape and are shaped by our self-concepts, behaviors, other people, and situations.”

In 1990, Leary and Kowalski developed a two-component model of impression management. Self-presentation, or impression management, “refers to the process by which individuals attempt to control the impressions others form of them” (Leary & Kowalski, 1990). Leary and Kowalski found this concept to have two distinct processes, impression motivation and impression construction (see Table 1). With the first process, impression motivation, a person wants to have a certain image of themselves in others’ minds, but does not necessarily act to create this impression. Impression management’s second component deals with the actual building, or construction, of an impression. A person acts in specific ways around other people to ensure those around him or her form a particular image of them.

Impression Motivation	Impression Construction
<ul style="list-style-type: none"> ▪ Goal-relevance of impressions ▪ Value of desired goals ▪ Discrepancy between desired and current image 	<ul style="list-style-type: none"> ▪ Self-concept ▪ Desired and undesired identity images ▪ Role constraints ▪ Target's values ▪ Current or potential social images

Table 1. Model of Impression Management (Leary & Kowalski, 1990)

Impression Motivation

People vary in their levels of attentiveness toward other people, and this attentiveness varies from situation to situation and from person to person. At two extremes, there is an individual who is oblivious to others' reactions or an individual who is acutely aware of how others respond to them and monitor everything they do. However, the majority of people usually fall somewhere between the two extremes and do so at a preattentive level, or a level which does not require them to consciously analyze others' reactions.

There are three motivating factors that aid a person in managing their impressions: 1) social and material outcomes, 2) self-esteem maintenance, and 3) development of identity. It is human nature to try to minimize the pain one feels and instead maximize the pleasure, and this is the case with impression management. People want to portray themselves in such a way as to gain desired social and/or material outcomes. Furthermore, impression management can help increase or decrease someone's self-esteem. Self-esteem maintenance depends on the reactions one receives from other

people and from self-evaluations. Successful reactions and evaluations result in a maintained or improved self-esteem, whereas negative reactions or evaluations can decrease one's self-esteem. People also self-present to create an image by engaging in behaviors that demonstrate who they are or who they want to be (Leary et al., 1990). The presented information allows others to form a personal idea of the type of person he or she is trying to project.

There are three main factors that help establish impression motivation: 1) the goal-relevance of impressions, 2) the desired goals' value, and 3) the discrepancy between the desired and current identity. These antecedents help determine the degree to which a person will manage his or her impressions. The more a certain impression will allow a person to come closer to one's goals, the more he or she will be motivated to create this specific image. How public the behavior will be, how dependent the individual is on the target of the impression, and the amount of contact the individual will have with the target all affect the relevance of the impression. More specifically, if a behavior is to be witnessed by numerous people, rather than just one person, one will concern him or herself with how the witnesses will perceive the behavior. If the behavior is to be witnessed by only one person, but this person is of great importance or often seen, the importance of good impression management often causes one to concentrate on the impression at hand. According to Leary & Kowalski (1990), all motives of impression management are more likely to occur if one's behaviors occur in public settings rather than in private.

Impression motivation is also related to the importance of a goal. The more important a goal is to a person, the more likely he or she will want to portray a certain

image to reach the goal. Thus, if a job applicant gets a final interview for an important job at a newspaper, he or she will want to portray an image of a good reporter and writer so he or she will be considered for the job over other applicants. Lastly, the degree of motivation for impression managing depends upon the difference between a person's current image and their desired image. People have a certain idea of how they want other people to see them, and if a person feels others do not see them this way, the person is more motivated to present him or herself as they wish to be seen than if they are already seen this way. Specifically, if someone feels he or she is seen as less intelligent than he or she is, then that person will attempt to appear more intelligent in others' eyes. Leary & Kowalski (1990) ascertain that "both failure and embarrassment increase impression motivation. [Those] people who have failed or been embarrassed will seek to repair" their identity.

Impression Construction

Impression construction is defined as the moment when a person decides upon the impression he or she wants to make and acts to create the impression. There are five main factors to this component of the model: self-concept, desired images, role constraints, target values, and current or potential image. Most people have an idea of who they are and the characteristics that comprise that idea. With this in mind, most people portray their best characteristics that comply with their self-concept for others to see. A person's self-concept also allows a person to understand what characteristics he or she can and cannot be successful in presenting to others. Individuals also tend to present impressions that are considered more desirable to others rather than undesirable impressions. Individuals may also allow significant others to have partial control in

creating an individual's public image. A person may present him- or herself in a way that will support the important person's views and feelings. For example, if a breast cancer survivor is trying to present herself as being healthy and competent in her daily activities, she is more motivated to present a healthy image to her spouse, children, friends, and employer. However, this desirable self-presentation must fall in line with the social role each person has. Failure to support this role could cause one's effectiveness in public to diminish. For example, a breast cancer survivor who is also a mother still has the responsibility of taking care of the family. Failure to perform 'motherly acts' could result in the breast cancer survivor being portrayed as an unfit mother to society.

Finally, peoples' ability to self-present depends upon the type of person they are thought to be now and the type of person they could be thought of as in the future. For example, a woman diagnosed with breast cancer who is typically thought of as a frail woman may present herself as less dependent on those around her during her breast cancer treatment in hopes that after she survives breast cancer, she will be thought of as a stronger woman than she was before breast cancer. When an individual is concerned that who they are seen as now and how they want to be seen in the future differ too greatly to successfully create that impression, anxiety may result.

Social Physique Anxiety

Hart et al. (1989) termed social physique anxiety as the anxiety an individual experiences when he or she feels other individuals are evaluating his or her physique/figure in a negative manner. More specifically, it is the anxiety that results from an individual feeling that they are not being successful in presenting the specific impressions he or she wants others to see. The 12-item Social Physique Anxiety Scale

was found to have high internal validity ($\alpha = .90$) and was significantly related with body cathexis and body esteem measures ($r = -.26$ to $-.82$, $p < .01$). More specific to women, the Social Physique Anxiety Scale was highly correlated to measures associated with weight and physical attractiveness ($r = -.82$, $p < .01$).

Physical concerns, such as physical attractiveness and weight, are the primary manner in which the self-presentation theory is applied to women with breast cancer. For example, if a breast cancer survivor believes she cannot be successful in presenting herself in a positive physical manner, and this is important to her, anxiety may occur. Again, this type of anxiety has been termed social physique anxiety by Hart et al. (1989) and is one way self-presentational concerns may be evaluated in a physical sense. Greater social physique anxiety is related to having more negative thoughts about your body and appearance (Hart et al., 1989). While body image is operationalized as social physique anxiety in the current study, the literature has not examined the self-presentation theory in women who have survived breast cancer.

Self-Presentational Research

Self-presentational concerns have been examined using different populations and various health behaviors. For example, older adults try to present themselves in ways that allow them to be seen as physically able and mentally competent, along with trying to be seen as physically attractive (Martin, Leary, & Rejeski, 2000). Martin, Leary, and Rejeski (2000) also report that both younger and older adults avoid necessary health screenings and medical care for fear of presenting their body in a negative manner. Young adults even partake in risky behaviors, such as not using a condom and binge drinking for self-presentational reasons (Leary, Tchividjian, & Kraxberger, 1994).

Martin, Sinden, and Fleming (2000) examined self-presentational concerns in undergraduate college students. Participants examined descriptions of a young person who exercised, did not exercise, or had no mention of an exercise status (control). The study reported that students rated the described person more favorably when he or she exercised as compared to those who did not participate in an exercise program. Exercisers were also chosen to have better nonphysical characteristics than non-exercisers and those in the control group. Among these characteristics, exercisers were considered happier, more intelligent, harder workers, friendlier and more sociable. These results illustrate that there are more positive self-presentational outcomes associated with exercising than not exercising. After breast cancer surgery, survivors may not want to exercise because they feel they cannot self-present themselves successfully. Not exercising results in self-presentational concerns related to not being an exerciser, as well as being less healthy and less sociable.

In another population, McAuley, Bane, and Mihalko (1995) examined self-presentation in middle-aged individuals. In their study, middle-aged sedentary participants participated in a daily exercise program for 20-weeks. At the conclusion of this study, physiological and psychological factors were improved. General efficacy was increased, whereas social physique anxiety and hip circumference were reduced. Increased exercise participation helped a person feel more confident in presenting themselves to others, which helped reduce negative body image. The results of this study are significant, in that the results could generalize to women with breast cancer. That is, women with greater physical activity levels may feel more confident in presenting themselves to others when recovering from breast cancer surgery.

Crawford and Eklund (1994) recruited college-aged females to watch two similar videotapes that included the same people in each video wearing different clothing. One tape had participants wearing a more revealing attire of tights and leotards, and the other tape had a more conservative attire of shorts and t-shirts. Crawford and Eklund (1994) reported that the greater a person's physique anxiety, the more the person disliked the revealing tights and leotard setting and approved of the conservative shorts and t-shirt setting. This demonstrates that self-presentational concerns not only affect someone after participation in an exercise program, but also affects how they present themselves during exercise. This is a key point when considering women recovering from breast cancer surgery. Most of these women have had a figure altering surgery causing them to be careful in how they present themselves. Findings from Crawford and Eklund (1994) would suggest that it is important to ensure a comfortable exercise setting for breast cancer survivors, especially initially, to help decrease their physique anxiety.

People are faced with self-presentational concerns in many decisions they make. Women who have survived breast cancer are no different. These women want to be seen as healthy, feminine women. This is demonstrated by the decisions women make in treatment options. Breast conserving surgery is often chosen over mastectomy to help preserve part of the breast, which can help maintain a partial amount of femininity (King et al., 2000; Steinberg et al., 1985). If a mastectomy is the only surgical option, many women opt for reconstructive surgery in order to appear as a whole woman after surgery (Schover, 1994; Arora et al., 2001). Self-presentational concerns confront breast cancer survivors not only in treatment decisions, but also in the actions they engage in as survivors.

As previously mentioned, breast cancer survivors face many physical and psychological challenges throughout the recovery process. Methods for helping breast cancer survivors to successfully face these challenges are still being investigated. McAuley, Bane, and Mihalko (1995) reported that physical activity helped reduce the physique anxiety of middle-aged adults. Thus, physical activity is one possible method that could improve body image and self-presentational concerns in breast cancer survivors.

Physical Activity

The benefits of physical activity have been well documented in the literature, yet many Americans turn down opportunities to be physically active. Physical activity is defined as “bodily movement produced by skeletal muscles...that requires expenditure of energy and produces progressive health benefits” (Hoeger & Hoeger, 2003). In 1996, the Surgeon General (U.S.Department of Health and Human Services, 1996) wrote a report on physical activity stating that moderate physical activity on most days of the week can provide the general public with many health benefits. Benefits range from improving components of physical fitness to improving and maintaining psychological factors. Recent studies on physical activity have reported relationships with psychological outcomes. For example, physical activity has been shown to have a negative relationship with anxiety (Rejeski, Thompson, Brubaker, & Miller, 1992) and social physique anxiety (Lantz, Hardy, & Akiyama, 1997; Eklund et al., 1994), a positive relationship with self-motivation, exercise self-efficacy, and positive attitudes towards exercising (Wilcox & Storandt, 1996), self-esteem (McAuley, Mihalko, & Bane, 1997), and body image (Loland, 1998; Dekel, Tenenbaum, & Kudar, 1996; Zabinski et al., 2001).

Physical Activity and Body Image

McAuley et al. (1995) studied the relationship between social physique anxiety, body composition, and exercise participation in 56 males and 58 females who were sedentary and between the ages of 45 and 64 years. Each participant completed a battery of inventories and individual physiological assessments before and after participating in a 20-week aerobic exercise program. At completion of the aerobic exercise program, the participants had significant reductions in weight, circumferences, and body fat percentage (all p values $< .05$). Females were found to have more physique anxiety than males both pre- and post program ($p < .005$). The younger participants (aged 45-49 and 50-54 years) also had more anxiety than older participants (aged 55-59 and 60-65 years) pre- and post program ($p < .01$). The researchers noted that physique anxiety levels for the participants' between 45 and 54 years of age were higher than past reports for undergraduate students and adolescent female gymnasts. This is ironic knowing that most people consider younger individuals to be more concerned about how others perceive them. McAuley et al. (1995) also reported that physique anxiety was significantly correlated to the participants' percent body fat and hip circumference ($r = .43$ and $.40$, respectively $p < .001$). Thus, participation in a moderate intensity exercise program can provide the health benefits of decreased weight, body composition and circumferences, as well as reduced physique anxiety.

Caruso and Gill (1992) examined the effects of weight training and an aerobic exercise program on several physiological and psychological variables. Thirty-four female undergraduates voluntarily participated in either a weight training or aerobic physical education class. A control group consisted of members from other classes

(fencing, bowling, and volleyball). Participants completed psychological and physiological measures. Classes met three times a week for ten weeks. At the completion of the study, the participants' overall Physical Self-Perception Profile (PSPP), a measure to assess the self-perceptions in the domains of sports competence, physical strength, body attractiveness, and overall physical self-worth, significantly increased over time ($p < 0.05$). In looking at the relationship between the psychological and physical variables, a relationship was found between the attractive body subscale of the PSPP and both body weight and percent body fat ($r = -.52$ and $-.37$, respectively, $p < 0.01$). This study demonstrates that exercise can improve psychological and physical measures, and improvements in both of these areas may lead to improved body image.

Tucker and Maxwell (1992) examined 60 females with a mean age of 20.2 years enrolled in a beginner weight training class at a university. A comparison group consisted of 92 females who did not participate in a weight-training program. The experimenters collected both psychological and physiological information on the experimental and comparison groups. Both groups participated in physical exercise about three days per week, not including weight training. The weight-training group participated in a 15-week training program. After the program, the experimental group had an average weight loss of 1.75 pounds, increased their strength, and decreased their total skinfold thickness as well as at the triceps, abdomen, and thigh sites.

In comparison to the control group, the experimental group scored significantly better on the General Well-Being Schedule (Fazio, 1977), a single measure of subjective well-being and psychological distress, ($M = 72.02$) and the modified Body Cathexis Scale (Tucker & Maxwell, 1992), a body image measure assessing the satisfaction and

dissatisfaction with various body parts and body functions ($M = 138.78$). The experimental group also had greater improvements on both measures from pre- to posttest ($M = +7.43$ and $+23.78$, respectively). The results suggest that weight training has a significant effect on body image and emotional well-being as compared to a control group with no weight training.

Collectively, research demonstrates that physical activity participation improves body image in the general population. While research has examined physical activity participation in more specific populations, the relationship between physical activity and body image has not been thoroughly examined in breast cancer survivors. However, physical activity research in breast cancer survivors has studied variables shown to be related to body image in other populations.

Physical Activity and Breast Cancer

Physical and psychological health are improved as a result of physical activity participation in women who have survived breast cancer (Pinto & Maruyama, 1999; Baldwin & Courneya K.S., 1997). Winningham et al. (1989) studied a sample of women that were diagnosed with breast cancer. The participants were receiving adjuvant chemotherapy following their breast cancer surgery (lumpectomy and mastectomy). An exercise group and a control group were formed. Physical measures were collected before and after the 10-week intervention. At the conclusion of the study, the experimenters reported that the exercise group reduced the total sum of their skinfolds by 3.19 mm in comparison to the control group who increased their skinfolds by 9.6 mm. This change was also evident in the mean percent body fat of each group. The exercise group decreased their body fat by 0.51% while the control group increased mean body fat

by 2.91%. An average weight gain was observed by both groups. While this may be of some concern, the exercise group's weight gain consisted of more lean tissue than fatty tissue since body composition decreased slightly, and lean tissue is more dense than fatty tissue, thus weighing more (Hoeger et al., 2003). Therefore, this study demonstrates that aerobic exercise can help women undergoing chemotherapy stabilize their weight and decrease their body fat.

Mock et al. (1994) examined women (34–61 years of age) during their chemotherapy treatment and after breast cancer surgical treatment. Participants were randomly assigned to an experimental group or a control group of usual care. The experimental group participated in a walking exercise program and a support group for four to six months, depending on the length of the chemotherapy cycle. The usual care group had general breast cancer treatment but no exercise program or support group activities. Psychosocial questionnaires and physical function tests were given before chemotherapy began, midway through chemotherapy, and one month after the chemotherapy cycle ended. The results concluded that in comparison to the usual care group, the experimental group did better overall and the usual care group actually decreased the amount of activity they did each day during chemotherapy. The experimental group improved their physical functioning and could walk further in the 12-minute walk at posttest as compared to the usual care group ($M = 1186.8$ and 986.8 meters, respectively). The experimental group significantly decreased their emotional distress from pretest (0.20) to posttest (0.16) while the usual care group increased their emotional distress from pretest (0.26) to posttest (0.35). Body satisfaction was constant at all three testing periods for the experimental group but decreased for the usual care

group. This study demonstrates the importance of physical activity after breast cancer surgery and during adjuvant chemotherapy for improving and maintaining the breast cancer survivors' physical capabilities and psychosocial outcomes, including body satisfaction.

Kolden et al. (2002) examined sedentary women (M age = 55.3 years) who had been surgically treated for breast cancer without the use of a control group. In the exercise program, participants met 3 days per week over 16 weeks. This program followed the American College of Sports Medicine's guidelines. Measures of physical and psychological health were collected. All participants safely completed the exercise program and improvements in both physical and psychological variables occurred. Significant ($p < 0.001$) improvements were seen in the areas of sit-and-reach ($F = 31.99$), aerobic capacity ($F = 62.79$), bench press ($F = 61.87$), and leg press ($F = 101.57$). The mood of the participants improved throughout the program. Depression significantly decreased, as measured by the Beck Depression Inventory ($p < 0.01$) and the Hamilton Depression Scale ($p < 0.001$). Significant changes ($p < 0.01$) were reported in both positive and negative affect, as measured by the Positive and Negative Affect Scale. Also, physical well-being significantly improved ($F = 10.19$). This study demonstrates that survivors of breast cancer can safely participate in an exercise program while improving their physical and psychological functioning.

While these studies represent research that has examined physical activity outcomes among breast cancer survivors, the interpretation and application of the results are limited due to flaws in methodology, sample characteristics, and the lack of focus on the relationship between physical activity and body image. Specifically, studies have

failed to outline detailed and reproducible procedures and methods (Kolden et al., 2002). Research studies have also included heterogeneous populations consisting of breast cancer survivors from different breast cancer stages, surgical treatments, and adjuvant therapies. Specific to this study, the relationship between physical activity and body image has not been examined in the breast cancer literature; rather studies involving breast cancer survivors have focused on either the effects of physical activity on physical and other psychological measures or the effects of the breast cancer experience on body image. Factors such as body composition, strength, and self-efficacy have been demonstrated to be related to both physical activity and body image. Thus, there is a need for studies to examine the relationship between physical activity and body image in survivors of breast cancer.

Summary and Study Objectives

As the number of breast cancer survivors continues to increase, body image disturbances have also increased as a result of the body altering surgical treatments and adjuvant therapies associated with breast cancer treatment. In other populations, research has demonstrated that physical activity is related to improved psychological functioning, including enhanced body image. Although preliminary research examining physical activity in breast cancer survivors reports potentially positive outcomes, the results must be interpreted and applied carefully due to study limitations and lacking a theoretical framework. One theory that can provide a framework to understanding body image in breast cancer survivors is the self-presentational theory. Within the self-presentational framework, social physique anxiety has been used to assess the anxiety an individual

experiences in a social setting. The question remains, however, whether there is a relationship between physical activity and social physique anxiety in breast cancer survivors.

The present study is part of the Exercise and Quality of Life in Older Women with Breast Cancer Study, or EQUAL, which was designed to evaluate the physical fitness status and psychological well-being of women who have had breast cancer surgery. Within this larger study, the present thesis has two primary objectives. The first purpose is to examine the relationship between physical activity and social physique anxiety in women with breast cancer. Once this relationship is established, our second purpose is to identify potential correlates of the physical activity and social physique anxiety relationship.

Study Hypotheses

Hypothesis 1: Increased physical activity participation will be related to decreased social physique anxiety in breast cancer survivors.

Hypothesis 2: Breast cancer survivors who are more physically active will have a lower body mass index and better strength, which will mediate the relationship between physical activity and social physique anxiety.

Hypothesis 3: Breast cancer survivors who are more physically active will have greater self-efficacy, which will mediate the relationship between physical activity and social physique anxiety.

METHODS

Participants

A total of 61 female breast cancer survivors were recruited for the current thesis, which uses data collected from the Exercise and Quality of Life Among Older Women with Breast Cancer, or EQUAL, study. Female breast cancer survivors were recruited who received health care from a center affiliated with a Winston-Salem area medical center. Potentially eligible patients were identified through examination of their medical charts. These patients were provided information that introduced them to the current study via a brochure and a letter. Interested women were contacted over the phone by a nurse recruiter who was affiliated with the medical center or the clinic at which they received treatment.

For patients to be eligible to participate in the current study, they were required to meet the following criteria: 1) Female of at least 50 years of age, 2) Diagnosed with stage 0-II breast cancer, 3) Post-menopausal, 4) Able to participate in a moderate exercise program, 5) Plans to remain in the Piedmont Triad area within 30 miles of the study site, and 6) Not homebound or dependent upon a walker or wheelchair, have documented cardiac conduction disturbances, unstable angina, dementia or any other chronic disease with a survival rate of less than 4 years.

Measures

The measures for the current study are categorized into two subgroups including physical and psychosocial assessments. The physical category consisted of measures that

assessed the participants physical activity level and physical attributes. The psychosocial measures included the dependent variable, social physique anxiety (SPA), as well as appearance-related self-efficacy. Although EQUAL utilized many physical and psychosocial measures, only the measures analyzed for this thesis will be described (See Appendix B).

Physical Measures

Physical Activity Participation. The Community Health Activities Model Program for Seniors (CHAMPS) was used to assess the physical activity level of each participant. This scale was developed by Stewart et al. (1997) to assess the amount of participation in physical activity behaviors among older adults over a time period of a month rather than a week. The CHAMPS measures how active a person is in their social life, how physically active in their daily life, and how many flights of stairs climbed in a typical day. Responses for self-reported activity levels range from 1 = “not at all active,” to 3 = “fairly active,” to 6 = “extremely active.” The responses for the self-reported number of flights climbed per day (one flight = 12-15 steps) ranged from 1 = “none” to 5 = “5 or more flights.”

The CHAMPS also assesses the frequency of different activities per week (e.g., walking, cycling, swimming) and the calories expended per week in these activities. Activities fall into five subgroups: social activities, recreation and hobbies, work around the house, walking and jogging, and other types of exercise. Two forms of responses are required for this section. First, participants are required to note the number of times per week each activity was performed on average. Second, participants note the amount of

time spent each week on the different activities. Responses include 1 = “less than 1 hour a week”, 2 = “1-2.5 hours a week”, 3 = “3-4.5 hours a week”, 4 = “5-6.5 hours a week”, 5 = “7-8.5 hours a week”, and 6 = “9 or more hours a week.” Metabolic equivalencies are applied to each activity performed and adjusted for the participant’s body weight. To calculate the total moderate intensity physical activity score used for the current thesis, the frequency scores per week for each moderate intensity activity were summed. See Appendix B for a list of all moderate intensity items. The CHAMPS measure has been shown to have concurrent validity when the instrument was compared to collected physical activity data (Stewart et al., 1997). Stewart et al. (1997) reported the three-month stability coefficients for the frequency measure ($r = 0.57$) and the caloric expenditure assessment ($r = 0.84$).

Body Mass Index. Body mass index (BMI) assesses an individual’s weight relative to their height, according to the American College of Sports Medicine’s Guidelines (2000). It estimates critical fat values to help determine an individual’s risk for certain diseases and is a measurement of thinness or fatness. BMI is calculated by dividing a person’s body weight in kilograms by his or her height in meters squared (kg/m^2). For this study, participants’ body weight was collected on a standardized scale and height was self-reported.

Muscular Strength. Muscular strength was determined by using a handgrip dynamometer. The dynamometer was adjusted to fit each participant’s hand. The participant started with their elbow flexed at a 90-degree angle. To begin the test, the participant began squeezing the Dynamometer with maximal force while extending her elbow until her arm was perpendicular to the floor. Each effort lasted between 2 and 3 seconds. The other

hand was then tested, allowing the first hand to rest. This process was repeated in order to collect two measurements, read in kilograms, for each hand. Both measurements for each hand were recorded and the maximum score of the two measurements was used. The right and left grip scores were summed to calculate the total grip strength score.

Psychosocial Measures

Social Physique Anxiety. To assess social physique anxiety, the Social Physique Anxiety Scale (SPAS) was administered (Hart et al., 1989). The SPAS assesses the degree to which a person becomes anxious when their physique is evaluated in a public setting. This 12-item questionnaire consists of the responses, 1 = “not at all characteristic,” 2 = “slightly characteristic,” 3 = “moderately characteristic,” 4 = “very characteristic,” and 5 = “extremely characteristic.” The responses are summed to get an overall score ranging from 12 to 60, and higher scores imply higher anxiety levels. McAuley et al. (1995) reported excellent internal consistency ($\alpha = 0.90$) with adequate construct validity for the SPAS.

Appearance Self-Efficacy. To assess appearance self-efficacy, the Appearance Self-Efficacy Questionnaire (AppSE) was administered. This questionnaire assessed how efficacious participants were in their ability to appear physically attractive to others. The 10-item questionnaire included responses ranging from 0% = “not at all confident” to 100% = “highly confident.” Responses were summed and then divided by the total number of items, with the final value ranging from 0% to 100%. Higher scores correspond to higher levels of self-efficacy. McAuley and Mihalko (1998) and Katula et al. (1999) have reported acceptable ranges for internal consistency (.71-.90) for various efficacy measures.

Procedures

Due to the large testing battery for EQUAL, the testing procedure consisted of two sessions. First, each participant was contacted by a nurse recruiter over the phone. With verbal consent from each participant, psychosocial questionnaires were mailed to the participant's home to be completed and returned upon the first visit to the testing site. During the first visit to the testing site at Wake Forest University, all participants were required to sign an informed consent form written in compliance with the Wake Forest University Institutional Review Board (See Appendix A). If written informed consent was not obtained at this visit, the information from the initial psychosocial packet was not used.

Both physical measures and psychosocial questionnaires were assessed. The order of data collection for the physical measurements was counterbalanced. Half of the participants had measurements of the 12-minute walk, height, weight, circumferences, skin-folds, and measures of flexibility (Battery A) assessed during the first visit, while the other half had the 6-minute walk, muscular strength, and grip strength (Battery B) assessed. At the conclusion of the first visit, participants were given psychosocial questionnaires to complete at home and return during the second visit. Participants were also given an Accusplit Eagle pedometer and pedometer log to wear and complete over the seven days between visits. The second visit consisted of each participant completing the second half of the physical measures battery and psychosocial questionnaires. Pedometers and pedometer logs were returned during the second visit. The two visits occurred within a 7-day interval.

Analytic Plan

Descriptive statistics were completed to describe participant characteristics. Additional descriptive statistics (means, standard deviations, minimum, and maximum values) were determined for the physical measures (physical activity participation, body mass index, and hand grip strength) and the psychosocial measures (social physique anxiety and appearance self-efficacy). Reliability was determined with Cronbach's alphas for each measure. Scatterplots and histograms were employed to ensure normality of the data. In the event that a variable was not normally distributed, the square root of the variable was calculated and used in further analyses. Pearson correlational methods were used to examine the relationships as outlined in the study hypotheses. For those variables that were significantly correlated with both the independent and dependent variables, Linear Models were conducted to analyze the mediational relationships in the physical activity and social physique anxiety relationship.

RESULTS

Participant Characteristics

The participants ($n = 61$) in this study were females ($M = 63.3$ years, $SD = 7.3$) with ages ranging from 50 to 77 years. The sample population was mostly Caucasian (80.3% Caucasian, 8.2% black or African American, 3.3% American Indian or Alaskan Native, and 1.6% Hispanic) with 60.7% presently married. The majority of the sample was highly educated with 32.8% receiving some college education and 31.1% being a college graduate. In addition, 19.7% of the women were working full time and 36.1% were retired. Regarding their surgical treatment, about half of the participants received a lumpectomy (50.8%) with the other half receiving a mastectomy with either reconstruction (6.6% implant and 3.3% TRAM flap) or no reconstruction (27.9%). In conjunction with surgical treatment, the majority of the participants received some form of adjuvant therapy (19.7% chemotherapy, 26.2% radiation, and 14.8% chemotherapy and radiation). See Table 2 for all participant characteristics.

Table 2. Participant Characteristics

Age (yrs.)	Mean (<u>SD</u>)	63.3 (7.3)
	Range	50-77
Marital Status (%)		
	Married	60.7
	Marriage-like relationship	1.6
	Divorced or Separated	13.1
	Widowed	18.0
Race (%)		
	White	80.3
	Black or African American	8.2
	American Indian or Alaskan Native	3.3
	Hispanic	1.6
Education (%)		
	Grade School	3.3
	Some High School	1.6
	High School Diploma or GED	24.6
	Some College	32.8
	College Graduate	31.1
Employment (%)		
	Retired	36.1
	Full-time Homemaker	14.8
	Employed Full-time	19.7
	Employed Part-time	13.1
	Disabled, unable to work	4.9
	Other	4.9
Surgery (%)		
	Lumpectomy	50.8
	Mastectomy without reconstruction	27.9
	Mastectomy with implants	6.6
	Mastectomy with TRAM flap	3.3
Adjuvant Therapy (%)		
	No Adjuvant Therapy	34.4
	Chemotherapy	19.7
	Radiation	26.2
	Chemotherapy/Radiation	14.8

Descriptives for Physical and Psychosocial Variables of Interest

Means, standard deviations, minimum, and maximum values for physical and psychosocial variables of interest are reported in Table 3. Participants in the current study were moderately active, as demonstrated by the CHAMPS questionnaire. Specifically, participants reported that they participated in moderate intensity level physical activities an average of 4.5 times per week (SD = 4.7). Participants were overweight with an average body mass index (BMI) of 27.4 kg/m² (SD = 5.1), ranging from 18.8 to 41.1 kg/m². The participants demonstrated moderate levels of grip strength, with the sum (right and left combined) being 44.4 kilograms (SD = 9.5). Participants in the study reported a moderate level of physique anxiety (M = 34.5, SD = 8.9) and also reported having a moderate amount of confidence in their appearance (M = 52.2, SD = 24.8).

Table 3. Descriptive Statistics for Physical and Psychosocial Variables

Variables	Mean	SD	Min	Max
SPAS (12-60)	34.5	8.9	16.0	53.0
AppSE (0-100)	52.2	24.8	4.0	100
CHAMPS	4.5	4.9	0.0	18.0
Body Mass Index	27.4	5.1	18.8	41.1
Grip Strength (kg) (right + left)	44.5	9.5	29.8	62.0

Internal Consistency for Physical Activity and Psychosocial Measures

Cronbach's alpha (1951) was employed to determine the internal consistency for the moderate intensity physical activities of the CHAMPS questionnaire (CHAMPS) and the psychosocial (SPA and AppSE) measures. The appearance self-efficacy measure demonstrated excellent internal consistency, and the CHAMPS and the SPA scales demonstrated moderate internal consistency. The consistency for each scale is reported in Table 4.

Table 4. Internal Consistency for Self-Reported Measures

Measure	Alpha
Appearance Self-Efficacy	.98
Social Physique Anxiety	.77
Community Health Activities Model Program for Seniors	.62

Correlational Relationships Among Variables of Interest

The primary objective was to determine if there was a significant relationship between physical activity and social physique anxiety. The secondary objective was to identify the correlates of the physical activity and social physique anxiety relationship. Histograms illustrated that all of the data were normally distributed, except for the CHAMPS data. Therefore, the CHAMPS data was normalized by taking the square root of the data set. Pearson correlational analyses were implemented to determine the relationships among the primary and secondary variables of interest, including moderate intensity physical activity (CHAMPS), social physique anxiety (SPAS), appearance self-efficacy (AppSE), body mass index (BMI), and total grip strength (grip strength). The Pearson product moment correlation matrix illustrating these relationships can be found in Table 5. The type of surgery participants received and the number of months post surgery were examined as potential covariates of the physical activity-social physique anxiety relationship. However, correlational analysis demonstrated that these factors were not related to either physical activity or social physique anxiety in the current population.

The following sections will provide a detailed analysis of the physical activity and social physique anxiety relationship, as well as the relationships between physical activity, social physique anxiety, and the secondary variables of interest.

Table 5. Correlational Relationships among Variables of Interest

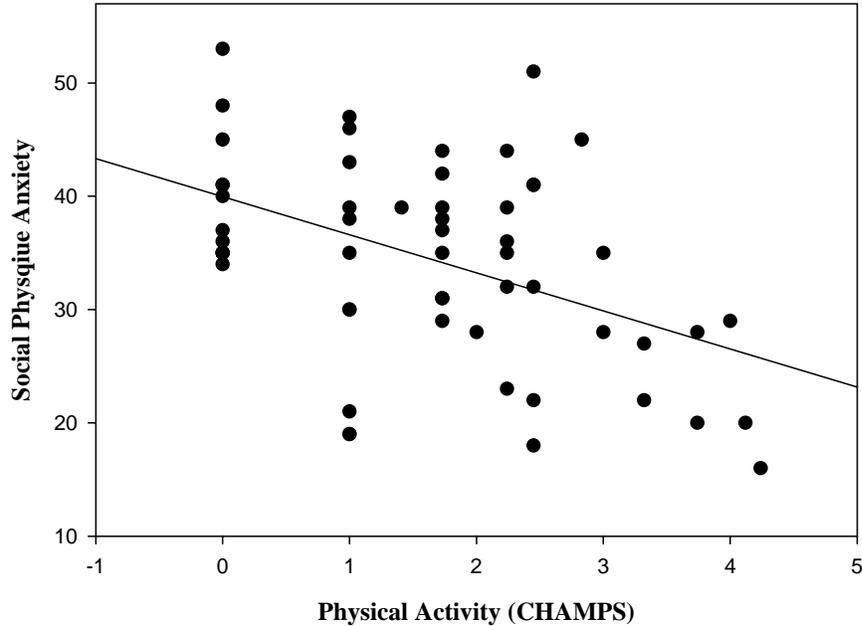
Variable	CHAMPS	SPAS	AppSE	BMI	Grip Strength
CHAMPS	1.00	-.457**	.343**	-.355**	-.246
SPAS		1.00	-.648**	.429**	.051
AppSE			1.00	-.135	.151
BMI				1.00	.210
Grip Strength					1.00

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

Correlational Relationship between Physical Activity
and Social Physique Anxiety

The correlational analysis revealed a significant relationship between physical activity (CHAMPS) and social physique anxiety (SPA), as indicated by a negative correlation ($r = -.479$, $p < .01$). This significant relationship between physical activity and social physique anxiety is further illustrated by a scatterplot, as demonstrated in Figure 2. Those women who participated more in moderate intensity physical activity reported lower levels of social physique anxiety.

Figure 2. Scatterplot of Physical Activity and Social Physique Anxiety

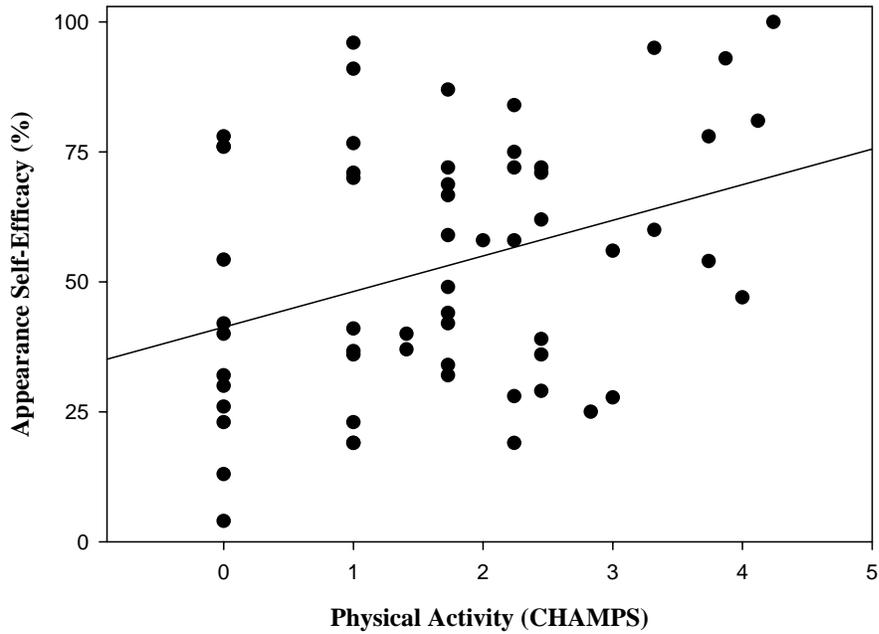


Correlational Relationship between Physical Activity and
Secondary Variables of Interest

The correlational analysis revealed a significant relationship between physical activity (CHAMPS) and appearance self-efficacy ($r = .363$, $p < .01$) and between physical activity (CHAMPS) and body mass index (BMI; $r = -.355$, $p < .05$). A non-significant relationship was observed between physical activity (CHAMPS) and total grip strength ($r = -.173$). The significant relationships are further illustrated through scatterplots.

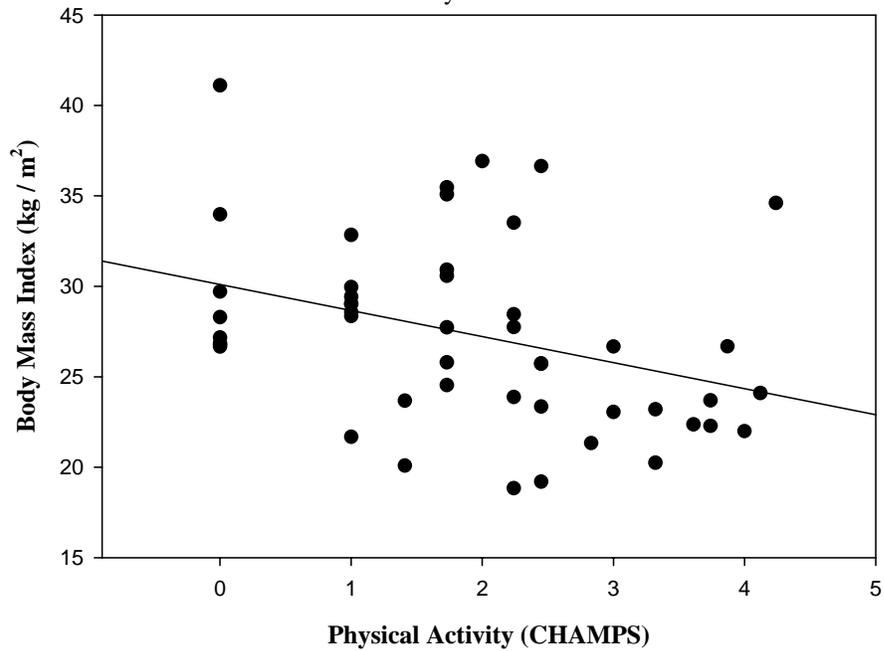
Physical activity and appearance self-efficacy were positively correlated, in that the women who reported being more physically active also reported having greater appearance self-efficacy (Figure 3).

Figure 3. Scatterplot of Physical Activity and Appearance Self-Efficacy



Physical activity was negatively related to body mass index. That is, the women who reported being more physically active had a lower body mass index than the women who were less active (Figure 4).

Figure 4. Scatterplot of Physical Activity and Body Mass Index

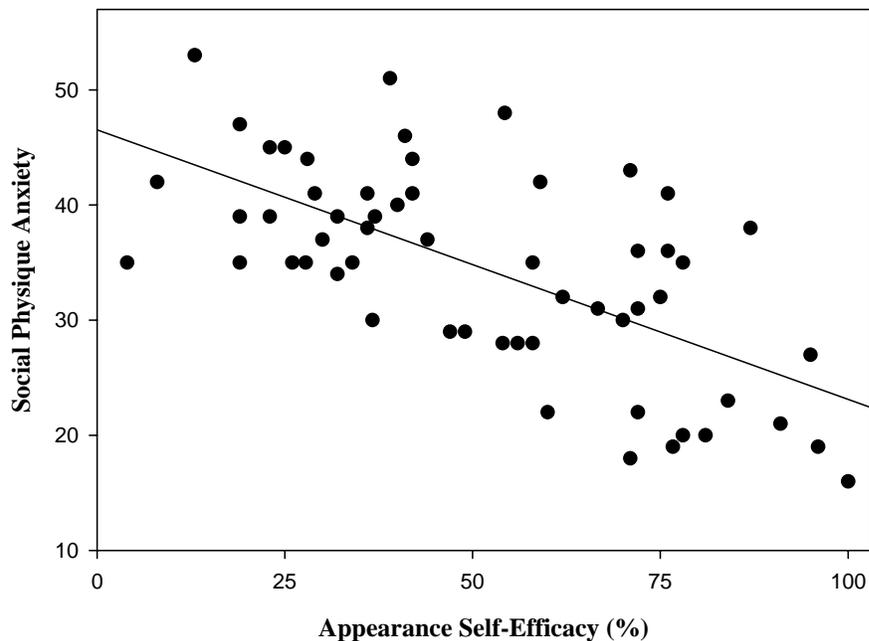


Correlational Relationships among Social Physique Anxiety and
Secondary Variables of Interest

Social physique anxiety was significantly related to appearance self-efficacy ($r = -.648, p < .01$) and body mass index ($r = .429, p < .01$). Social physique anxiety was not significantly related with total grip strength ($r = .051, p > .05$). These significant relationships are further demonstrated through scatterplots.

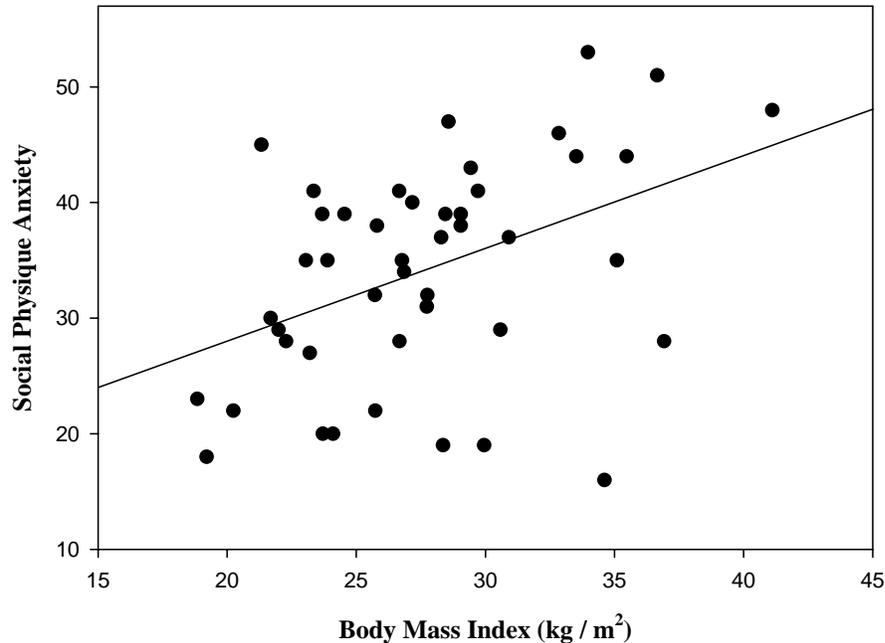
Appearance self-efficacy is negatively related to social physique anxiety, in that those women who reported having better appearance self-efficacy also reported having less physique anxiety (Figure 5).

Figure 5. Scatterplot of Appearance Self-Efficacy and Social Physique Anxiety



Body mass index was positively related to social physique anxiety. The women who had a lower body mass index were less physique anxious than the women who had a higher body mass index (Figure 6).

Figure 6. Scatterplot of Body Mass Index and Social Physique Anxiety



Linear Regression Analyses

Linear models were conducted to test the mediational relationships of body mass index and appearance self-efficacy in the relationship between physical activity and social physique anxiety. Grip strength was not used in the models as it was not significantly correlated to either physical activity or social physique anxiety. Initial regression analysis between physical activity (predictor variable) and social physique anxiety (dependent variable) was significant ($F(1, 54) = 14.23, p < .001$) and resulted in a beta weight (β) of $-.457$ ($p < .001$) (See Table 6). Addition of appearance self-efficacy

into this regression model produced a β of $-.556$ ($p < .001$) and reduced physical activity's β to $-.286$ ($p < .01$) (See Table 7). A separate regression model employing body mass index as an additional predictor variable with physical activity was also significant ($F(2, 42) = 10.6, p < .001$). In this model, body mass index's β was equal to $.278$ ($p < .05$) and physical activity's β reduced to $-.418$ ($p < .01$) (See Table 8). When all three variables (physical activity, appearance self-efficacy, and body mass index) were entered into the regression equation as predictors, physical activity's β decreased to $-.211$ ($p = ns$), and β 's for appearance self-efficacy and body mass index equaled $-.568$ ($p < .001$) and $.265$ ($p < .05$), respectively (See Table 9).

Table 6. Linear Models of Physical Activity on Social Physique Anxiety

Predictor Variable	β	ρ
Physical Activity	$-.457$	$.000$

Table 7. Linear Models Testing for Mediation of Appearance Self-Efficacy on Social Physique Anxiety

Predictor Variable	β	ρ
Physical Activity	-0.286	.008
Appearance Self-Efficacy	-0.556	.000

Table 8. Linear Models Testing for Mediation of Body Mass Index on Social Physique Anxiety

Predictor Variable	β	ρ
Physical Activity	-0.418	.003
Body Mass Index	.278	.045

Table 9. Linear Models Testing for Mediation of Appearance Self-Efficacy and Body Mass Index on Social Physique Anxiety

Predictor Variable	β	ρ
Physical Activity	-0.211	.064
Appearance Self-Efficacy	-0.568	.000
Body Mass Index	.265	.015

DISCUSSION

With the survival rate of breast cancer increasing, more women are presented with the challenge of physical and psychological changes associated with breast cancer and its treatment. Changes in body image are one of the outcomes from breast cancer that survivors may experience. Research has demonstrated that negative changes in body image do occur as a result of the type of breast cancer surgery (King et al., 2000; Shimozuma, Ganz, Petersen, & Hirji, 1999) and its adjuvant therapy (Wilmoth et al., 2001; Demark-Wahnefried et al., 1993). It is important, therefore, to examine correlates of body image in this population.

Physical activity has been shown to influence body image in other populations (Ahmed, Hilton, & Pituch, 2002; Koff & Bauman, 1997; Tucker & Mortell, 1993). While the role physical activity may play in body image among breast cancer survivors has just begun to be examined (Pinto, Clark, Maruyama, & Feder, 2003), most studies have been limited to an examination of physical activity in relation to other variables of interest in the population of breast cancer survivors and lacked a theoretical framework (Pinto et al., 1999; Mock et al., 1994; Kolden et al., 2002). Remaining within the self-presentational theory as a guiding framework, social physique anxiety can be used to evaluate the anxiety an individual experiences when presenting her physique in a social setting. Thus, the main objective of this study was to determine if there was a significant relationship between physical activity and social physique anxiety in breast cancer survivors. The secondary objective was to determine the mediational role of several secondary variables of interest in this relationship.

Physical Activity and Social Physique Anxiety

It was hypothesized that increased physical activity participation would be related to decreased social physique anxiety in breast cancer survivors. This hypothesis was supported by the results of this study in that there was a significant inverse relationship between physical activity and social physique anxiety. The strong correlation between physical activity and social physique anxiety in this sample of breast cancer survivors was predicted, as the relationship between physical activity and body image has been demonstrated in other populations (Ahmed et al., 2002; Tucker et al., 1993). For example, Ahmed et al. (2002) reported that the majority of college-aged women enrolled in a strength training class indicated that their perceptions of body image improved at the conclusion of the class. The strength training class also positively influenced the women's attitudes toward their body. Tucker and Mortell (1993) also reported improvements in body image among middle-aged women participating in physical activity.

Recognizing the relationship between physical activity and body image in other populations, there are several potential reasons as to why this relationship exists in the breast cancer survivor population. Physical activity provides a method for an individual's body to become more toned, maintain muscle definition, and become more cardiovascularly fit. These changes do not have to be truly physical in nature, but may be imagined. Whether objective or perceived changes, having a firmer, more shapely body and being physically fit has been shown to result in women feeling better about their bodies and themselves. In addition, working hard during these activities along with

giving an earnest effort appear to influence improvements in body image (Tucker et al., 1993). The current study supported these findings, such that the women who were more physically active at moderate intensity levels also reported less social physique anxiety, indicating better body image.

While underlying mechanisms in the relationship between physical activity and body image have not been examined directly in this population, factors associated to both physical activity and body image have been shown to change over time during exercise interventions (Winningham et al., 1989; Kolden et al., 2002). The factors associated with physical activity and body image are both physical (body mass index and strength) and psychosocial (self-efficacy) in nature.

Mediational Relationships

It was hypothesized that breast cancer survivors who were more physically active would have a lower body mass index, better strength, and greater self-efficacy, which would mediate the relationship between physical activity and social physique anxiety. This hypothesis was partially supported. Significant relationships between physical activity, social physique anxiety, and the secondary variables of interest were needed for mediational relationships to be examined. Body mass index and appearance self-efficacy were significantly correlated with both physical activity and social physique anxiety. Grip strength was not significantly correlated with either physical activity or social physique anxiety. Thus, grip strength was not used in mediational analyses. The following sections examine the roles played by body mass index, grip strength, and appearance self-efficacy in the physical activity and social physique anxiety relationship.

Grip Strength

It was hypothesized that the participants who were more physically active would have greater strength. It was hypothesized as well that those women who reported greater strength would also report having decreased social physique anxiety. These hypotheses were not supported by the results of the current study. The lack of significant relationships were surprising since these relationships have been demonstrated in the literature in other populations as well as in breast cancer survivors (Tucker et al., 1992; Kolden et al., 2002; Ahmed et al., 2002). For example, Tucker & Maxwell (1992) reported that females who participated in a 15-week exercise intervention reported increases in muscular strength as well as improvements in body satisfaction in comparison to the control group.

There are several potential reasons as to why grip strength was not significantly correlated to physical activity and social physique anxiety in this study. For one, most of the literature measures and reports strength in terms of 1-repetition maximums (1 RM) on strength equipment, such as the bench press and leg press. Grip strength can be used as an estimate of upper body strength; however, it has been reported to be a weak correlate to overall strength (Hoeger et al., 2003). Another reason grip strength may not have been significantly correlated to physical activity in the current study is that grip strength is a measure of upper body strength and the CHAMPS questionnaire does not specifically measure upper body physical activity. In fact, the majority of activities on the CHAMPS involve the use of the lower body (i.e. walking and running) versus the upper body. Yet another potential explanation for the lack of a relationship between physical activity and grip strength may be related to the design of the study. More specifically, grip strength

may be a better measure of changes in strength in a longitudinal study rather than a single measure of strength in a cross-sectional study (Skelton, Young, Greig, & Malbut, 1995). Skelton, Young, Greig, and Malbut (1995) reported improvements in grip strength in a cohort of older women who participated in a 12-week exercise intervention as compared to older women in a control group. It would appear, therefore, that using grip strength as a one time measurement in a cross-sectional study may not provide an accurate measurement of an individual's strength.

One possible reason grip strength was not related to social physique anxiety in the current study may be due to the measure employed in this study. The social physique anxiety scale measures how an individual feels when presenting his- or herself in front of others; yet, there is no specific question pertaining to presenting oneself as strong to others on the social physique anxiety scale. In order to examine this relationship, both the physical and psychosocial measures should be congruent and conceptually matched to the topic of interest. A second potential explanation of why a relationship between social physique anxiety and grip strength did not exist is that much of the work that has been done in the area of body image and self-presentation stems from appearance-related concerns. However, strength cannot be physically seen by just looking at an individual and is therefore not a salient predictor of an individual's appearance-related perceptions. Since grip strength was not significantly correlated to either physical activity or social physique anxiety in the current population, mediational analyses could not be conducted for grip strength. Future research should further examine the relationships between physical activity, body image, and strength using more appropriate and sensitive methods to assess these relationships in women with breast cancer.

Body Mass Index

It was hypothesized that the participants who were more physically active would have a lower body mass index. In addition, it was also hypothesized that those participants with a lower body mass index would have decreased social physique anxiety. These hypotheses were supported. Body mass index is a technique used to determine excessive thinness or fatness. The relationship between physical activity and body mass index, as well as the relationship between body mass index and body image, has been reported throughout the literature (Loland, 1998; McAuley, Bane, & Mihalko, 1995; Winningham et al., 1989). For instance, Loland (1998) studied men and women between the ages of 18 and 67 years. She reported that both men and women who were more physically active had a significantly lower body mass index when compared to those who were physically inactive. Loland (1998) also reported that the participants who had a lower body mass index were more satisfied with their body than those participants who had a greater body mass index. Since significant relationships were reported between physical activity and body mass index as well as between body mass index and social physique anxiety, linear regression analyses were performed to test for mediational relationships.

Body mass index was hypothesized to mediate the relationship between physical activity and social physique anxiety. This hypothesis was based on two concepts. First, women who have a greater body mass index are likely to report less participation in physical activity (Loland, 1998). Loland (1998) reported that men and women who were more physically active, when compared to men and women who were not physically active, had a lower body mass index. Second, women who have a lower body mass index

have better body image (Sands, 2000). In 2000, Sands examined the relationship between body mass index and body image. He reported that a female's body mass index is related to a female's drive for thinness, which in turn is related to body satisfaction. The greater a female's drive for thinness, the greater her dissatisfaction with her body. Although the correlational relationships between physical activity and body mass index and between body mass index and social physique anxiety were supported in the current study, the mediational relationship was not supported in the regression analysis.

The lack of a mediational role played by body mass index may have resulted from body mass index not being a measure of body composition. Body mass index cannot distinguish between fat tissue and lean tissue; rather, it is more a measure of extreme fatness and thinness (Hoeger et al., 2003). Since muscle tissue, or lean tissue, is more dense and thus weighs more than fat tissue, individuals with more lean tissue can be considered overweight according to their body mass index. A more accurate measurement of body composition, such as dual x-ray absorptiometry (DEXA), may have resulted in significant findings. DEXA scans actually measure an individual's lean and fat tissue to calculate his or her percent body fat. Thus, DEXA scans separate those individuals who are truly overweight from those who are more physically active with more lean tissue.

Additionally, the physical activity questionnaire, which was originally completed by self-report may have been more accurate if completed in an interview format (Melanson & Freedson, 1996; Wiktorin et al., 1999). Several studies have determined that questionnaires administered in an interview format provide more detailed information because they are less likely to be interpreted incorrectly (Melanson et al.,

1996). This is particularly evident for the CHAMPS questionnaire. Specifically, there are several opportunities for an individual completing the CHAMPS via self-report to count the same activity more than once. Although most often unintentional, reporting the same activity more than once is easy to do if the individual is not properly instructed. To counteract this assessment flaw, the interview format could clarify questions to avoid counting the same activity several items. Even though body mass index was not a mediator in the relationship between physical activity and social physique anxiety, body mass index was significantly related to both physical activity and social physique anxiety in a correlational manner in the current population.

Appearance Self-Efficacy

It was hypothesized that breast cancer survivors who were more physically active would have increased confidence, or efficacy, in their ability to present themselves in front of others. It was also hypothesized that those women who reported greater appearance efficacy would also report decreased social physique anxiety. These hypotheses were supported by the results of this study in that the breast cancer survivors who reported being more physically active also reported having greater appearance self-efficacy. In addition, those survivors who reported greater appearance self-efficacy also reported decreased social physique anxiety.

Physical activity facilitates physical changes in an individual's body that may lead to improvements in appearance self-efficacy and in turn enhancements in social physique anxiety. These changes are supported by theory, as outlined in Bandura's Social Cognitive Theory (1986). Bandura outlines four methods for improving self-efficacy: performance accomplishments, vicarious experience, verbal persuasion, and

interpretation of physiological or emotional state. Thus, these four methods of improving self-efficacy are proposed to improve a breast cancer survivor's appearance self-efficacy.

The first method is through performance accomplishments. In other words, the more an individual participates in an activity, the more he or she masters the tasks involved with the activity. Thus, participating in physical activity provides an individual with the mastery of performing certain physical tasks that the individual initially may have felt uncomfortable doing. This mastery experience leads to increases in self-efficacy. Participation in physical activity may also lead to physical bodily changes, which may have an indirect effect on improving appearance self-efficacy.

The second method of increasing appearance self-efficacy is through vicarious experiences. Vicarious experiences involve learning through the experiences of other people. More specifically, if an individual witnesses someone else in their same situation, such as a breast cancer survivor, being successful in making bodily changes through physical activity, the individual will feel more confident in their ability to participate in physical activity and ultimately, to present themselves in an attractive manner.

The third method of improving an individual's appearance self-efficacy is through verbal persuasion. Verbal persuasion is encouragement from other people for an individual to change a behavior or to be successful in an activity. For example, if a breast cancer survivor is continuously encouraged by her healthcare provider and/or family to participate or continue participating in physical activity due to the health and body change benefits, she will increase her appearance self-efficacy, thus being more likely to continue to participate in the physical activity.

Finally, increasing appearance self-efficacy may be accomplished by a positive interpretation of physiological or emotional states. For example, a breast cancer survivor begins an exercise program on her own and does not know that with exercise her heart rate will increase and she may become short of breath; she may interpret these natural reactions as her doing something wrong and failing at this activity, decreasing her confidence level in performing this activity. However, if the breast cancer survivor is educated by an exercise specialist on the natural physiological reactions to physical activity, she will know what to expect during exercise. Thus, she will increase her efficacy in physical activity, which will in turn increase her participation in the activity and her appearance self-efficacy.

Appearance self-efficacy has not been examined extensively in the literature; nevertheless, physical activity has been shown to improve different aspects of efficacy, (McAuley & Jacobson, 1991) as well as greater efficacy resulting in better body image (McAuley et al., 1995). McAuley and Jacobson (1991) reported that adult female participants who had good attendance and participation were more efficacious, or confident, in their ability to continue to exercise than those who did not have good attendance or participation. A more recent study by McAuley et al. (1995) reported that participation in an exercise intervention program resulted in improved physical self-efficacy. The study also reported that those participants who had greater physical self-efficacy at the conclusion of the intervention had lower social physique anxiety. Thus, the participants with lower physique anxiety felt more comfortable about presenting their bodies in front of others.

Specific to appearance self-efficacy, Bane (1995) reported that physical attractiveness self-efficacy improved due to exercise participation when exercisers were compared to controls that did not participate in exercise. In this study, college-aged females participated in an eight-week exercise intervention with either a cognitive-behavioral intervention or an exercise-only attention group. An additional non-exercise group served as a control group. While the results were not statistically significant in this small pilot study, most likely due to power issues, larger effect sizes were demonstrated in the two exercising groups when compared to the control group. The largest effect size for appearance self-efficacy was reported in the exercising group paired with the cognitive-behavioral intervention. Thus, future research should examine the effects of physical activity coupled with behavioral interventions in women who have survived breast cancer.

In the current study, it was hypothesized that appearance self-efficacy would mediate the relationship between physical activity and social physique anxiety. This hypothesis was based on the social cognitive and self-presentation theories, suggesting that the outcomes an individual expects from specific behaviors depends upon the confidence, or efficacy, he or she has in that behavior or in presenting that behavior to others. Thus, the more efficacious an individual is about presenting him- or herself as attractive as a result of participating in physical activity, the lower his or her social physique anxiety will be. Although these relationships were supported in the correlational sense, regression models did not support this mediational hypothesis.

When appearance self-efficacy was added to the regression model as an additional predictor variable with physical activity, the beta weight of physical activity did decrease

from $-.457$ to $-.286$. This decrease in the beta weight was not enough, however, to demonstrate a mediational effect by appearance self-efficacy. With an increase in the number of women in the sample, this trend may have resulted in a significant beta weight decrease lending appearance self-efficacy as a partial mediator in the relationship between physical activity and social physique anxiety.

The actual importance that an individual places on their appearance may provide a potential explanation for the lack of a significant mediational relationship. More specifically, if an individual is not confident in her ability to appear attractive to others and she finds this important to her, her body image is more likely to suffer as a result than if presenting an attractive body was not important to her. Thus, an assessment of the importance of appearing attractive to others would be important for future research to examine in order to determine the mediational role of appearance self-efficacy between physical activity and body image.

When appearance self-efficacy and body mass index were placed into the regression models as predictors of social physique anxiety along with physical activity, the beta weight of physical activity decreased from $-.457$ to $-.211$. The decrease in the beta weight caused the beta weight to become non-significant. This non-significant beta weight suggests that body mass index and appearance self-efficacy are partial mediators when entered together. However, upon closer examination of the regression model, it appears as if body mass index strengthens appearance self-efficacy's ability to become a partial mediator. Further, since body mass index was marginally significant in the linear regression as a predictor of social physique anxiety with physical activity alone, it is likely that body mass index added enough power for appearance self-efficacy to play a

more significant mediational role in the physical activity-social physique anxiety relationship.

Limitations and Future Directions

Although this study has made positive contributions to the literature in that the relationship between physical activity and social physique anxiety has been demonstrated among women who have survived breast cancer, it is important to acknowledge the study's limitations. The limitations to be discussed in this section include: 1) the sample size and generalizability, 2) the measurement tools, and 3) the research design. Building on these limitations, future directions for both research and practice involving women who have survived breast cancer will be identified.

Sample Size and Generalizability

The current study consists of a larger sample size than many of the studies involving female survivors of breast cancer (Segar et al., 1998; Winningham et al., 1989; Kolden et al., 2002). However, a cross-sectional study examining the relationship between physical activity and body image among breast cancer survivors incorporating a larger number of survivors should be conducted to provide more power in order to examine the factors that may influence this relationship. Our sample size provided adequate power for significant correlational relationships and trends toward significant mediational relationships. However, a larger sample size would provide the means for a closer examination of the mediational effects of secondary variables of interest.

The inadequate sample size and the stage of the survivor's breast cancer are possible limitations for the generalizability of the results. Increased efforts toward

recruiting more diverse populations (i.e., different ethnic and economic backgrounds) would help increase the generalizability. In addition, having several clinical sites following the same protocol in different geographical locations would create a large database, while at the same time increasing generalizability to female breast cancer survivors in different locations, rather than in just one specific location. The stage of a survivor's breast cancer may also limit the generalizability of the study findings. For example, a more advanced cancer may have different effects on body image than a less advanced cancer. Even though studies are strengthened by homogeneous samples in order to investigate specific relationships, a larger heterogeneous population that can be stratified would lend the results to be more generalizable.

Measures

While the measurement tools employed in the current study have been validated, modifications in the administration of several of the measures may have provided more valid assessments. The measure of physical activity, the Community Health Activities Model Program for Seniors (CHAMPS), is a self-reported measure of physical activity. Traditionally, participants have completed the CHAMPS by self-report, which Stewart et al. (1997) have reported to be a valid measure of physical activity in older adults. However, more recently it has been speculated that physical activity would be more accurately reported by participants if the CHAMPS was administered in an interview format rather than completed by the participant alone. In support, other studies have found the interview format to yield more accurate data than individually completed questionnaires (Melanson et al., 1996; Wiktorin et al., 1999). In the future, research

studies should administer this measure in an interview format to collect data that more truly reflects the participants physical activity levels.

Furthermore, to calculate body mass index, weight and height need to be collected using standardized techniques. In this study, weight was collected in a standardized manner with the same scale each time. However, height was not initially collected. It was not until the completion of the study that height was collected from each participant in a self-report manner. While past research has reported that self-reported weight and height are reliable as actual measures of weight and height (Davis, Fox, Cowles, Hastengs, & Schwass, 1990), when examining the relationship between weight, height, and body image it may be beneficial to compare self-reported and actual measurements. Until more definitive conclusions are reached on self-report versus objective measurements, researchers should collect objective measurements of weight and height when these measurements are used in further calculations, such as body mass index.

Research Design

Cross-sectional study designs are initially needed to determine relationships between variables of interest to provide support for future research. Many of the research studies examining body image in breast cancer survivors are cross-sectional in design (Rowland et al., 2000; Wapnir, Cody, & Greco, 1999; Mock, 1993; Ganz et al., 1998). While it is important in the initial phases of a research agenda, cross-sectional studies are limited because they cannot examine change as a result of an intervention nor can they determine whether one factor caused another. Moreover, longitudinal study designs should be implemented to look at the effect of an intervention over time. Changes that result from participation in an intervention would then provide healthcare providers with

information to improve rehabilitation and healthcare outcomes. As an extension of this study, the effect of a physical activity intervention on body image in female breast cancer survivors should be examined.

Implications

In the current study, the results have illustrated a significant relationship between physical activity and social physique anxiety. These data provide a rationale for future research to further examine the extent of this relationship with both clinical and public health implications.

Clinical Perspective

Correlational analyses suggest that the relationship between physical activity and social physique anxiety is significant in women who have survived breast cancer. It has been suggested that longitudinal studies should examine the effect of a physical activity intervention on body image in survivors of breast cancer over time. Based on the findings from future longitudinal studies, physical activity may be an important rehabilitation component to improve body composition, appearance self-efficacy, and body image in breast cancer survivors.

Therefore, clinicians are encouraged to assess physical functioning, as well as appearance self-efficacy and body image perceptions. In addition, it is important for clinicians to measure changes in these areas over time to examine how physical activity leads to changes in physical functioning, appearance self-efficacy, and body image. For example, if an increase in body image is an important goal for rehabilitation, programs should be designed to positively impact efficacy perceptions. Besides providing a means for physical activity to improve body image in this population, physical activity could

also provide the survivors with an outlet to relieve the stress and physical symptoms associated with breast cancer treatment. Thus, physical activity could be an added asset to the rehabilitation process of breast cancer for several reasons.

Public Health Perspective

With the number of breast cancer cases increasing each year and an 86% five-year survival rate (American Cancer Society, 2002), additional attention to the rehabilitation process of women with breast cancer is warranted. Research has demonstrated the negative change in body image in women after breast cancer treatment (Steinberg et al., 1985; Schover, 1991; Schover, 1994; King et al., 2000; Lindop et al., 2001; Ganz et al., 1998). A negative change in body image resulting from breast cancer treatment results in the need to restore the breast cancer survivor's body image back to or above pre-surgery levels. A woman's breast is part of her femininity. Changes with her breast due to breast cancer treatment could result in a decrease in her body satisfaction, which in turn could limit her physical activity and result in further disability as well as a decrease in quality of life.

While improving a breast cancer survivor's quality of life and function should be the ultimate goal in the rehabilitation process, potential mediators and moderators need to be investigated. By demonstrating that physical activity and body image are significantly related, a physical activity rehabilitation program may be one potential means for increasing long-term physical activity participation and improving a breast cancer survivor's quality of life. As many women are presented with the challenge of coping with the physical and psychological changes brought about from breast cancer and its treatment, strategies and opportunities to restore themselves, physically and

psychologically, is an important avenue for future investigation and holds significant implications for public health, as well as in the life of a breast cancer survivor.

APPENDIX A

WAKE FOREST UNIVERSITY SCHOOL OF MEDICINE WINSTON-SALEM, NC

INFORMED CONSENT FORM

STUDY TITLE: Pilot Study for "Exercise and Quality of Life in Older Women with Breast Cancer"

PURPOSE OF THIS RESEARCH STUDY: This study is evaluating the physical fitness status and psychological well being of women who have had breast cancer surgery. We believe that physical activity may reduce functional decline and enhance quality of life in older women with breast cancer.

HOW WERE YOU SELECTED TO PARTICIPATE? You were selected to participate in this study by a referral from your physician, your diagnosis and time since surgery.

WHAT YOU WILL BE ASKED TO DO IF YOU PARTICIPATE IN THIS STUDY: If you agree to participate, you will participate in a physical fitness assessment involving a walking test, and strength and flexibility testing. You will be asked to come for 3 visits over 3 weeks. The first visit will take 3 hours, the second visit will take 2 hours and the last visit will take one hour. You will also be asked to complete questionnaires. The testing will determine your physical capabilities and then an exercise program will be designed for you. Study visits will take about one hour each. *There is no cost to participants for any part of this study.*

DURATION OF THE STUDY: The exercise assessment will be held at Wake Forest University. A tailored exercise program will be designed by our exercise specialists for you to do at home.

RISKS OF YOUR PARTICIPATING IN THE STUDY: Risks of participating in the study are small. A slight risk of injury and lymphedema during the exercise exists, but precautions will be taken to minimize that risk. Muscle soreness may occur after strength testing. Should you experience a physical injury or illness as a direct result of your participation in this study, reasonable necessary medical services will be offered at the usual charges. To the extent of available research insurance coverage maintained by The Wake Forest University School of Medicine, the reasonable costs of these necessary medical services will be paid up to \$25,000. The insurance policy for this coverage is provided by the St. Paul Insurance Company, and provides a maximum of \$25,000 for each claim and is limited to a total of \$250,000 for all claims in one year. The Wake Forest University School of Medicine and The North Carolina Baptist Hospitals

Incorporated do not assume responsibility for these Medical services or to provide any other compensation for such injury or illness. Additional information may be obtained from the Medical Center's Director of Risk Management at (336) 716-3467.

BENEFITS OF PARTICIPATION IN THE STUDY: Potential benefits of participating in the study are uncertain and may be minimal. Some participants might benefit from a reduction of physical and psychosocial morbidity *such as depression or anxiety*, following cancer treatment. Participants will also be assisting researchers to further their understanding of how to minimize the negative effects of the diagnosis and treatment of breast cancer. You will receive a tailored exercise program. No other benefits may be realistically expected.

WHOM TO CONTACT WITH QUESTIONS ABOUT THIS STUDY: If you have any questions or concerns, you can call the study's Principal Investigator: Dr. Sally Shumaker at (336) 716-3838. You may also contact the Chairman of the Institutional Review Board of the Wake Forest University School of Medicine with questions about your rights as a research participant at (336) 716-4542.

YOUR RIGHTS CONCERNING THIS STUDY: You have the right not to participate in this study. If you choose not to participate, the medical care you receive will not be affected. You are free to withdraw from this study at any time. Your information will be protected and all information will be available only to the principal investigators and the research staff. If data from this study are published, your name will not be used.

If you agree to participate, please sign your name below. One copy is for our records; the other is for you to keep. Thank you very much for your participation.

NAME _____

DATE _____

PERSON ADMINISTERING CONSENT _____

APPENDIX B

SOCIAL PHYSIQUE ANXIETY SCALE

The items below are statements regarding how you feel about your physique in social settings.

INSTRUCTIONS: Please indicate the extent to which the statement is characteristic of you by marking the box under the appropriate phrase.

1. I am comfortable with the appearance of my physique/figure.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. I worry about wearing clothes that might make me look too thin or overweight.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. I wish I wasn't so uptight about my physique/figure.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. When I look in the mirror I feel good about my physique/figure.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Unattractive features of my physique/figure make me nervous in certain social settings.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. In the presence of others, I feel apprehensive about my physique/figure.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. I am comfortable with how fit my body appears to others.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. It would make me uncomfortable to know others were evaluating my physique/figure.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. When it comes to displaying my physique/figure to others, I am a shy person.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. I usually feel relaxed when it is obvious that others are looking at my physique/figure.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. When in a bathing suit, I often feel nervous about the shape of my body.

<i>Not at all characteristic</i>	<i>Slightly characteristic</i>	<i>Moderately characteristic</i>	<i>Very characteristic</i>	<i>Extremely characteristic</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

COMMUNITY HEALTH ACTIVITIES MODEL FOR SENIORS

1. Which of the following statements best describes how active you have been during the past 4 weeks, that is, had hobbies, work, social activities, or other activities that kept you busy?

Not at all active	A little active	Fairly active	Quite active	Very active	Extremely active
<input type="radio"/>					

2. Which of the following statements best describes how physically active you have been during the past 4 weeks, that is, done activities such as brisk walking, swimming, dancing, general conditioning, or recreational sports?

Not at all active	A little active	Fairly active	Quite active	Very active	Extremely active
<input type="radio"/>					

3. During the past 4 weeks, about how many flights of stairs did you climb during a typical day? (one flight= 12-15 steps, equivalent to going from one floor to another)

None	Less than 1 flight	1-2 flights	3-4 flights	5 or more flights
<input type="radio"/>				

Think about the past 4 weeks. For each activity, please write **HOW MANY TIMES** each week, on average, you did it. Next, please fill in the circle representing how much **TOTAL TIME**, on average, you spent doing that activity each week.

Social Activities:	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
a. Visit with friends and family (other than those you live with)	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Go to the senior center.....	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Do volunteer work.....	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Attend church or take part in church activities....	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Attend other club or group meetings....	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Recreation and Hobbies:	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
f. Use a computer.....	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
g. Dance (such as square, folk, line, ballroom)(do not count aerobic dance here)	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Do wood-working, needlework, drawing, or other arts or crafts.....	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Recreation and Hobbies:	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
i. Play golf riding a cart (count <u>walking time</u> only)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Play golf, carrying/pulling your equipment (count <u>walking time</u> only)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Attend a concert, movie, lecture, or sport event...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
l. Play cards, bingo, or board games with other people...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Shoot pool or billiards	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Play singles tennis (do <u>not</u> count doubles)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Play doubles tennis (do not count singles)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Skate (ice, roller, in-line)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Play a musical instrument ...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Read...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Work Around the House:	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
s. Do Heavy work around the house (such as washing windows, cleaning gutters)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t. Do light work around the house (such as sweeping or vacuuming)..	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u. Do heavy gardening (such as spading, raking)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v. Do light gardening (such as watering plants)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
w. Work on your car, truck, lawn mower, or other machinery ...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Walking & Jogging, Including Treadmill:	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
x. Walk uphill or hike uphill (count only uphill part)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
y. Walk leisurely for exercise or pleasure...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
z. Walk to do errands (such as to/from a store or to take kids to school: count walk time only)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
aa. Walk fast or briskly for exercise (do not count walking leisurely or uphill)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
bb. Jog or run...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other Types of Exercise:	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
cc. Ride a bicycle or stationary cycle using legs only...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
dd. Do aerobic machines involving arms and legs (such as rowing or cross-country ski machines)	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ee. Do stair or step machine...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ff. Swim gently...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other Types of Exercise:	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
gg. Swim moderately or fast...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
hh. Do water exercises (do not count other swimming)	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii. Do stretching or flexibility exercises (do not count yoga or Tai-chi)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
jj. Do yoga or Tai-chi...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
kk. Do aerobics or aerobic dancing...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ll. Do moderate to heavy strength training (such as hand-held weights of more than 5 lbs., weight machines, or push ups)	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
mm. Do light strength training (such as hand-held weights of 5 lbs. or less, or elastic bands)...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other Types of Exercise:	Number of times a week (If none, write "0")	Less than 1 hour a week	1-2.5 hours a week	3-4.5 hours a week	5-6.5 hours a week	7-8.5 hours a week	9+ hours a week
nn. Do general conditioning exercises, such as light calisthenics or chair exercises (do not count strength training). _____	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
oo. Play basketball, soccer, or racquetball (do not count time on sidelines) ...	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
pp. Do other types of physical activity not previously mentioned (please specify) ... _____	Times a Week _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Codebook for CHAMPS Physical Activity Measures

Variable Label	Item Numbers	Coding Algorithms
Self-rated physical activity level	2 NOTE: Item 1 is a “context” variable; it is not scored.	No recodes from questionnaire. 1 = not at all active 2 = a little active 3 = fairly active 4 = quite active 5 = very active 6 = extremely active 5 and 6 can be combined due low frequency in category 6.
Flights of stairs per day	3	Recode so that: 1 = 0 flights 2 = .5 flights 3 = 1.5 flights 4 = 3.5 flights 5 = 5.5 flights
Caloric expenditure/week in all exercise-related activities ¹	3g, i, j, n, o, p, s, t, u, v, x, y, z, aa, bb, cc, dd, ee, ff, gg, hh, ii, jj, kk, ll, mm, nn, oo	For each activity: 1. Create new <u>duration variables</u> for <u>each</u> activity recoded as follows: 1 = 0.5, 2 = 1.75, 3 = 3.75, 4 = 5.75, 5 = 7.75, 6 = 9.75; if duration variable is not answered, score = 0. Duration is <u>hours/week</u> . 2. For each recoded duration variable, create new <u>weighted duration variable</u> for <u>each</u> activity by multiplying duration variable (#1) by corresponding MET value (see Table 2). 3. For each weighted duration variable, create <u>caloric expenditure per week</u> variable for <u>each</u> activity by multiplying weighted duration variable (#2) by 3.5 and by 60 (to convert METs/minute to METs/hour) and by (weight in kg/ 200). 4. Sum caloric expenditure per week variables across activities to create <u>caloric expenditure/ week</u> .
Caloric expenditure/ week in moderate-intensity exercise-related activities	3g, j, n, o, p, s, u, x, aa, bb, cc, dd, ee, gg, hh, kk, ll, mm, oo	Same as above, subset of activities with MET values \geq 3.0.
Kilocalories/kg/hr of all exercise-related activities	3g, I, j, n, o, p, s, t, u, v, x, y, z, aa, bb, cc, dd, ee, ff, gg, hh, ii, jj, kk, ll, mm, nn, oo	Sum weighted duration variables (see #2 above) across activities.

¹Based on American College of Sports Medicine formula: kcal/minute = METs * 3.5 * (body weight in kg/200). Our formula converts this into kcal/week. ACSM’s Guidelines for Exercise Testing and Prescription, 5th Edition. Baltimore: Williams & Wilkins (1995).

Variable Label	Item Numbers	Coding Algorithms
Kilocalories/kg/hr of moderate intensity exercise-related activities	3g, j, n, o, p, s, u, x, aa, bb, cc, dd, ee, ff, gg, hh, kk, ll, mm, oo	Same as above, subset of activities with MET values ≤ 3.0 .
Frequency/week of all exercise-related activities	3g, i, j, n, o, p, s, t, u, v, x, y, z, aa, bb, cc, dd, ee, ff, gg, hh, ii, jj, kk, ll, mm, nn, oo	SUM frequency scores/week for each of the activities (allow those with missing data on frequency to be included in the sum).
Frequency/week of moderate-intensity exercise-related activities	3g, j, n, o, p, s, u, x, aa, bb, cc, dd, ee, ff, gg, hh, kk, ll, mm, oo	SUM frequency scores/week for each of the activities (allow those with missing data on frequency to be included in the sum).

Summary of Metabolic Weights Assigned to CHAMPS Physical Activity Items

Var #	Variable	New Metabolic Weight*	In Moderate Score
g	Dance (such as square, folk, line, ballroom) (do not count aerobic dance here)	4.5	x
I	Play golf, riding a cart (count walking time only)	2.0	
j	Play golf, walking or pulling your equipment (count walking time only)	3.0	x
n	Play singles tennis (do not count doubles)	6.0	x
o	Play doubles tennis (do not count singles)	4.0	x
p	Skate (ice, roller, in-line)	4.5	x
s	Do heavy work around the house (such as washing, windows, cleaning gutters)	3.0	x
t	Do light work around the house (such as sweeping or vacuuming)	2.5	
u	Do heavy gardening (such as spading or raking)	4.0	x
v	Do light gardening (such as watering plants)	2.25	
x	Walk uphill or hike uphill (count only the uphill part)	6.0	x
y	Walk leisurely for exercise or pleasure	2.5	
z	Walk to do errands (such as to/from a store or to take children to school—count walk time only)	2.5	
aa	Walk fast or briskly for exercise (do not count walking leisurely or uphill)	3.5	x
bb	Jog or run	7.0	x
cc	Ride a bicycle or stationary cycle using legs only	4.0	x
dd	Do aerobic machines involving arms and legs (such as rowing or cross-country ski machines)	5.0	x
ee	Do stair or step machine	5.0	x
ff	Swim gently	3.0	x
gg	Swim moderately or fast	5.0	x
hh	Do water exercises (do not count other swimming)	3.0	x
ii	Do stretching of flexibility exercises (do not count yoga or Tai Chi)	2.0	
jj	Do yoga or Tai Chi	2.0	
kk	Do aerobics or aerobic dancing	3.5	x
ll	Do moderate to heavy strength training (such as handheld weights of more than 5lbs, weight machines, or push-ups)	4.5	x
mm	Do light strength training (such as handheld weights of 5lbs or less or elastic bands)	3.0	x
nn	Do general conditioning exercises, such as light calisthenics or chair exercises (do not count strength training)	2.5	

Var #	Variable	New Metabolic Weight*	In Moderate Score
oo	Play basketball, soccer, or racquetball (do not count time on sidelines)	5.0	x
pp	Other	NA	NA

* Based on Ainsworth BE, Haskell WL, Leon AS, Jacobs DR, Montoye HJ, Sallis JF, and Paffenbarger RS: Compendium of physical activities: Classification of energy costs of human physical activities. *Medicine and Science in Sports and Exercise*, 1993; 25: 71-80

NA = not applicable

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