AN ABSTRACT OF THE THESIS OF

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in Physical Education presented on July 20, 2001

Title: The Psychological Effect of Exercise on Breast Cancer Survivors

Abstract approved: [redacted]

This research study examined the psychological effect of exercise on breast cancer survivors. Three psychological parameters (depression, anxiety and self-esteem) were examined in order to determine if they were affected by the intervention of regular exercise. Breast cancer survivors ($n = 5$) participated in a specialty indoor cycling class called Recovery Cycle once per week for a period of eight consecutive weeks. All participants completed three psychological assessment tests at the beginning and end of the eight-week program. The administered tests were: The Beck Depression Inventory; the State-Trait Anxiety Inventory; and the Rosenberg Self-Esteem Inventory. Analysis of all pre- and post- tests indicated no significant difference among the three parameters of depression, anxiety and self-esteem. However, mean and standard deviation scores showed decreases in depression and anxiety levels, and increases in self-esteem levels. These results suggest that exercise has no effect on improving the psychological state of breast cancer survivors.

Limitations of this study are discussed, as well as recommendations for future research.

THE PSYCHOLOGICAL EFFECT OF EXERCISE ON BREAST CANCER SURVIVORS

A Thesis

Presented to

The Division of Health, Recreation and Physical Education

EMPORIA STATE UNIVERSITY

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

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by

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July, 2001

Approved for the Major Department

Approved for the Graduate Council

ACKNOWLEDGEMENTS

First and foremost, I give deepest thanks to my husband, Paul. Thank you for your endless encouragement, love and support, and for teaching me that the impossible is possible. I would also like to express sincere gratitude to my thesis chair, Dr. Kathy Ermler and committee members Dr. Joella Mehrhof and Dr. Deanna Hawes. Despite the distance, you provided me with a clear vision, invaluable guidance, and generous feedback. Your help in the writing of this thesis will always be greatly appreciated. Additionally, I would like to thank Rainy Kent, coordinator of Lifestyle Programming at the Cameron Recreation Centre, for introducing me to the incredible women of the Recovery Cycle program and giving me unlimited freedom and support to pursue this project. Lastly, I owe immense gratitude to the participants of this study, and all Recovery Cycle participants of the past, present and future. Your optimism and perseverance throughout your challenges are a true inspiration.

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CHAPTER 1

INTRODUCTION

Breast cancer is the number one killer of women aged 35-55 in America today and will claim some 40,000 lives this year (Ross, 2000). Although much research has been devoted to prevention and lowering the risk of breast cancer, little research has focused on the psychological recovery and return to wellness of those afflicted with this disease. The most common psychological symptoms associated with breast cancer treatments and mastectomies are depression, distorted body image, and anxiety (Segar, Katch, Roth, Garcia, Portner, Glickman, Haslanger, Wilkins, 1998). The physical side effects of intense fatigue during chemotherapy and radiation therapy only serve to exacerbate these psychological symptoms. The medical and fitness communities need to find ways to reduce the negative side effects of breast cancer treatments.

In general, research indicates exercise is associated with improvements in mental health including mood state and self-esteem (Raglin, 1990). The endorphins released during aerobic endurance activities as well as the camaraderie developed in many group and team environments create an atmosphere in which an individual's psychological state may be positively influenced and affected. Applying this knowledge to breast cancer rehabilitation would appear logical and beneficial. However, few prospective studies have examined the rehabilitation needs of breast cancer patients, and little is known about the predictors of health-related quality of life (QOL) in this population (Shimozuma, 1999). The effects of an intervention involving physical activity on breast cancer rehabilitation patients have been comparatively understudied. Mock, Burke,

Sheehan, Creaton, Winningham, McKenney-Tedder, Schwager, Liebman (1994) found 14 patients with breast cancer receiving adjuvant chemotherapy benefited physically and psychosocially from a program that included walking and a support group. A study by Segar (1998) looked at the effect of aerobic exercise on self-esteem and depressive and anxiety symptoms among breast cancer survivors, and found reduced levels of depression and anxiety after a 10 week moderate exercise program that included a minimum of 30 minutes of exercise at 60% of age-predicted heart rate maximum, 4 days a week. These studies suggest that in addition to enhancing physical rehabilitation, exercise serves to enhance psychological recovery after cancer as well.

Statement of Purpose

The purpose of this research study is to examine whether women who are rehabilitating from breast cancer and are participating in a weekly indoor cycling class have decreased levels of depression and anxiety, and increased levels of self-esteem after an 8-week program.

Hypothesis

The null hypothesis statements are as follows:

1. There is no difference between the pre test depression scores and the post test depression scores for women with breast cancer who participated in an indoor cycling program.
2. There is no difference between the pre test state/trait anxiety scores and the post test state/trait anxiety scores for women with breast cancer who participated in an indoor cycling program.
3. There is no difference between the pre test self-esteem scores and the post

test self-esteem scores for women with breast cancer who participated in an indoor cycling program.

Statement of Significance

Although breast cancer claims the lives of tens of thousands of women every year, improvements in early detection and treatment are creating improved rates of survival. This translates into higher numbers of women in need of both physical and psychosocial rehabilitation. Exercise has long been known to improve psychological status in terms of positive outlook and increased self-esteem. In relation to disease, and more specifically in relation to breast cancer, however, little is known of the potential benefits and effects of exercise in the rehabilitation process. As physical educators and fitness professionals, it is our duty to identify how exercise may be used to benefit not only healthy populations, but diseased and rehabilitative populations as well. This research project aims to identify whether exercise plays a positive and significant role in the psychological recovery process after breast cancer.

Definition of Terms

The following phrases and terms are defined to assist the reader in common understandings of their use throughout this research paper:

Anxiety. A nervous feeling or fear that something bad is going to happen; worry.

Depression. Sad and without enthusiasm or hope.

Exercise. Regular engagement in an activity or task that trains the body. Consistent participation in aerobic and anaerobic activity.

Lymphedema. A condition affecting up to 20% of all breast cancer survivors where lymph nodes leak lymphatic fluid, causing the upper arm or entire arm of the

afflicted side to swell. It was once believed that exercise caused and exacerbated lymphedema, but other studies have since disputed this claim (McKenzie and Harris, 1998).

Psychological Effect. A psychological change produced by an action or a cause; a result or an outcome expressed in psychological parameters.

Rehabilitation. To restore someone to their previous level of health after being afflicted with disease and/or undergoing treatment and surgery.

Recovery Cycle. The name of the indoor cycling class in which participants of this research study were registered. A specialty group fitness class designed for breast cancer survivors.

Self-esteem. Positive or negative feelings about one's own character and abilities.

Review of Literature

In a study examining the psychological problems experienced by women in the first year after mastectomy, Maguire, Lee, Bevington, Kuchemann, Crabtree and Cornell (1978) found 25% of women who had undergone mastectomy needed treatment for anxiety and/or depression one year after surgery. More recently, Broekel, Jacobsen, Balducci, Horton, Lyman (2000), found time since cancer diagnosis and chemotherapy completion were positively related to greater depressive symptomatology. Adverse effects of breast cancer diagnosis and treatment may be distressful and long lasting (Mock et al., 1997). The most common symptom of breast cancer treatment reported by patients is intense fatigue. When a patient feels fatigued, a natural response is to move less. Additionally, patients complaining of fatigue are usually advised to rest more by their healthcare provider. Over time, this lack of

movement leads to a reduced functional capacity and a decreased ability to tolerate exercise and normal activity (Mock et al., 1997). Anxiety, depression, and difficulty sleeping are common responses to stressors inherent in the diagnosis and treatment of breast cancer (Dow, 1996). With the improvements made in alternative surgeries such as lumpectomies (partial or selective mastectomy) and new effective drugs such as tamoxifen, survival rates have drastically improved in the past decade. Breast cancer screening, which only became widespread in the 1980's, is expected to improve survival rates. However, these heightened survival rates mean that post-surgical psychosocial adjustments will become of greater concern.

The diagnosis and treatment of breast cancer is also highly likely to cause an increase in state and trait anxiety in most patients. Fatigue, pain, social isolation, concerns about rejection in interpersonal relationships and haunting fears of recurrence and death are all very real problems for many breast cancer sufferers (Dow, 1996). Although treatment is initially successful for many women, the American Cancer Society says that breast cancer will return in about 50 percent of all cases. As one breast cancer survivor stated: "It's hard to say that things are back to normal when one survives breast cancer, because a survivor always has a fear that one day the cancer may return." (Young as quoted by Lewis, 2000).

Techniques for reducing anxiety among cancer victims have long existed in support groups, where meditation, relaxation and guided imagery are regularly employed. Exercise has been examined as a valid alternative intervention in studies by Mock et al. (1997), and Segar et al. (1998). Both of these studies found significantly lower levels of both depression and anxiety (also labelled as emotional distress) in their exercise groups.

Another study by Kolcaba (1999) looked at guided imagery as a tool in improving the radiation therapy experience for breast cancer patients. Kolcaba found guided imagery to be an effective intervention for enhancing the comfort of women undergoing radiation therapy for early stage breast cancer.

The amputation of a breast has a serious and pervasive impact on a woman's emotional health, self-concept and general well being (Meyerowitz, 1980). In Mock's study (1997), high levels of dissatisfaction with the body were reported frequently by the entire sample. Mock also pointed out the natural tendency to decrease activity when undergoing various intense therapies, adds to a woman feeling fatigued, weak and less able to cope. Thus, decreased self-esteem seems a predictable negative result, adding to the difficulty of the entire experience. A study by Al-Ghazal (1999) analyzed the psychological status of breast cancer patients as it related to the cosmetic outcome of their surgeries. There was a strong correlation between cosmesis and levels of anxiety and depression and between cosmesis and body image, sexuality and self-esteem. The study concluded that the cosmetic result has a marked bearing on the subsequent development of psychological symptoms of surgery.

The literature on the topic of breast cancer and exercise is relatively sparse. Although several studies have found exercise improves the functional status of an individual after breast cancer, few studies have delved into the effects of exercise on psychological and psychosocial health and well-being. A study by Young-McCaughan and Sexton (1991) appears to be the first to have found that patients with breast cancer who exercised had significantly higher quality of life ratings than those patients who did not exercise. Likewise, a 1994 study conducted by Mock et al. found that 14 breast

cancer patients receiving adjuvant chemotherapy benefited physically and psychosocially from an experimental rehabilitation program that included walking and a support group. More recently, Mock et al. looked into the effects of exercise in a 1997 study that examined exercise and its effects on fatigue, physical functioning and emotional distress during radiation therapy for breast cancer. The hypothesis was women who participated in a walking program would demonstrate higher levels of physical functioning and lower levels of symptom intensity than women who did not participate in this program. In an experimental design, 46 women between age 35 and 65 with newly diagnosed stage I and II breast cancer undergoing treatment were divided into two groups (exercise and usual care). They were given pre-tests, mid-tests and post-tests before, during, and 3 weeks after a 6-week radiation program. The tests measured both physical parameters (through a 12-minute walking test) and psychosocial parameters (through the Symptom Assessment Scales and the revised Piper Fatigue Scale). Following random assignment, the exercise group maintained their own self-paced home based walking program throughout treatment. The findings indicated that there were significant differences between groups, with the exercise groups scoring higher than the usual care group ($p=0.0003$) on physical functioning and lower on emotional distress symptom intensity. In fact, all variables (fatigue; difficulty sleeping; anxiety; depression and body dissatisfaction) were rated markedly lower among the exercise group. The limitation of this study was mainly the lack of control over the degree of subjects' participation in the exercise program (Mock, 1997). Most healthy individuals find exercise adherence to be a challenge, let alone those individuals experiencing the intense effects of therapy. It should also be noted that many women who undergo breast cancer radiation and

chemotherapy treatment often experience the most intense points of fatigue and depression several months after treatment (Harris, 2000), thus the post-test at 3-weeks may have been premature in finding true depression values. The study noted the high correlation between fatigue and the symptoms of depression, anxiety and sleeplessness, recommending further research be taken on the way to negate the effects of fatigue. The researchers did conclude, however, that a self-paced, home-based walking program could help manage symptoms and improve physical functioning during radiation therapy.

Segar et al. (1997) conducted another relevant study at the University of Michigan. The purpose of this study was to evaluate the effects of 10 weeks of aerobic exercise on depressive and anxiety symptoms and self-esteem on breast cancer survivors. 24 breast cancer survivors (mean age 48.9 years) were assigned randomly to exercise (EX) or exercise plus behavior modification (EX+B) groups. Both groups exercised at 60% of age-predicted maximum, four days a week for 30-40 minutes for a period of 10 weeks. The EX+B group was told to choose from a variety of rewards that they could give themselves if exercise goals were met. Analysis of the data indicated there were no significant differences found between the EX and EX+B groups, therefore the data were combined. A control group of 10 women undergoing usual care was also included. Participants were given pre and post tests in relation to their exercise program that were designed to measure depression (Beck Depression Inventory), state and trait anxiety (Speilberger State-Trait Anxiety Inventory), and self-esteem (Rosenberg Self-Esteem Inventory). The pre to post-test analyses showed that the women who exercised had significantly less depression and state and trait anxiety, but self-esteem did not change significantly. An additional measure was exercise adherence among participants whose

physicians had formally prescribed exercise and those whose physicians did not. The difference in actual minutes of exercise over the 10-week period between these two groups was approximately 500 minutes. Thus a physician's involvement in exercise promotion was found to be more crucial in influencing a patient's return to health than previously believed.

In addition to the studies by Mock (1997) and Segar (1998), Dimeo (1998) also researched aerobic exercise as therapy for cancer fatigue. Given the amount of research that finds a correlation between fatigue and the psychological issues related to breast cancer this study is also relevant. Dimeo et al. (1998) conducted a small study with 5 cancer patients. These patients were afflicted with different forms of cancer and were at different stages of radiation therapy or chemotherapy. All participants reported intense levels of fatigue. All participants had a training program that required walking daily on a treadmill (at an intensity that corresponded to a lactate threshold of 3 +/- 0.5 mmol.L^{-1}) for 6 weeks. At the end of the 6-week program, all participants experienced significant improvements in cardiovascular functioning, as well as a clear reduction in fatigue that enabled them to conduct normal daily activities again without substantial limitations. The small scope of this study may be viewed as a limitation, but the variety of cancer scenarios and the uniform benefits experienced by all participants may certainly be viewed as a strength.

Another study by Pinto and Maruyama (1999) reviewed the literature on exercise and breast cancer. The research clearly support the notion that exercise may alleviate many of the ravages of the disease such as psychological distress, fatigue, weight gain, premature menopause and changes in body image. The authors acknowledge that with

the increase in the number of women who have survived breast cancer, there is a growing need to attend to the physical and emotional effects of cancer and its treatment as experienced by these survivors. These authors concluded that exercise as an adjunctive treatment may help to attenuate the negative effects of the disease and its treatment, and thereby contribute to rehabilitation of women with breast cancer.

Scully, Kremer, Meade, Graham & Dudgeon (1998) reviewed research on exercise and psychological well being. The authors looked at the general findings of exercise and its impact on the psychological variables of depression, anxiety, stress, mood state and self-esteem. In regards to depression, the research suggest both acute and chronic exercise programs have a positive effect on clinically depressed individuals. However, the greatest anti-depressive effects seem to occur after 17 weeks of exercise (although observable effects begin after four weeks). In relation to anxiety, most research examined the effects of aerobic exercise, which has been found to be most beneficial at moderate to high intensities (50%-60% and 60%-70% respectively) with ideal program duration at 10-15 weeks. Some studies on anxiety and resistance and flexibility training actually found an increase in anxiety levels, thus more research in this area is warranted (Scully et al., 1998). Stress and aerobic fitness have shown an inverse correlation in some studies, suggesting that those who are more aerobically fit manage stress better. Based on the research, it appears aerobic and anaerobic exercise can positively affect different mood states including tension, fatigue, anger, and vigor in normal and clinical populations (Scully et al., 1998). Finally, the most complex psychological factor appears to be self-esteem. The data is less clear-cut in this area, but there does seem to be definite improvement of self-esteem levels in response to exercise.

The connection appears more significant among individuals who have lower self-esteem ratings in the beginning of a study. Research suggests aerobic exercise is more beneficial than anaerobic exercise, but the reviewers believe this may simply be a reflection of the fact that so little research has been done on self-esteem and strength training.

The findings indicate that exercise is highly likely to contribute to a faster and more optimistic return to health for a breast cancer survivor. Studies that further contribute to this body of knowledge, and better yet, studies that support the premise that exercise benefits cancer victims, will certainly serve to improve and enhance the quality of life after treatment. It will then behove those in the medical and fitness professions to encourage their patients and clients to exercise as part of their rehabilitation programs. Due to higher rates of recovery, efforts at improving quality of life after treatment of breast cancer is becoming a greater concern. New drugs, new treatment regimens, and better diagnostic techniques have improved the outlook for many, and are responsible, according to the American Cancer Society, for breast cancer death rates declining (Lewis, 2000). The most obvious area that appears to be lacking is information on precise exercise prescription, making further research a necessity.

CHAPTER 2

METHODOLOGY

Participants

Participants were registered members of a specialty indoor cycling class entitled "Recovery Cycle" offered at the Cameron Recreation Complex in Burnaby, British Columbia, Canada. A total of six participants (N = 6) committed to attending the class for a period of eight consecutive weeks. Age range of participants was 40 to 60 years (M = 50.3 yrs.). All participants had experienced breast cancer with most recent surgeries ranging from 7 years to 6 months ago (M = 4 ½ years). Four of the participants were currently taking medications, including didrocal, arimidex and clodronate.

Procedures

Permission to conduct this study was granted by the Institutional Review Board for Treatment of Human Subjects at Emporia State University (Appendix A). All participants were asked to sign an Informed Consent Form prior to testing (Appendix B). The intervention in this study was the weekly participation in aerobic activity and strength training in the form of a group indoor cycling class over a period of eight weeks. Classes were held one time per week, were 60 minutes in length and instructed by the researcher. The cardiovascular equipment used in the study were stationary Reebok spinning cycles. The indoor cycling class included a 5-10 minute warm-up on the cycles, 20-25 minutes of cycling at 60-80% of age predicted heart rate maximum, followed by 15-20 minutes of upper body strength work with resistive tubes, and ended with a 10 minute cool-down and stretch.

During the first meeting, participants were informed about the purpose and procedures of the study. All participants were given three psychological assessment tests to be completed by the second meeting. The six individuals randomly chose their own assessment test package from a stack numbered from 1 to 10 in order to maintain anonymity. Participants were given a thorough review of how to safely use the stationary bikes and how to adjust the seat and handle bars to their height. Instructions on how to calculate individual exercise heart rate training zone based on age predicated heart rate maximum were provided. Additionally, participants were educated on how to use Borg's modified Rating of Perceived Exertion (RPE) Scale from 0 to 10. Participants were encouraged to adjust the resistance on the bikes to their own desired intensity level, while aiming to maintain an exercise heart rate of 60%-80% of their age predicted maximum heart rate, and/or a RPE of 6-8 out of 10. Upper body exercises were modified for those with restricted range of motion due to past surgeries and/or lymphedema. The musical accompaniment to the cardiovascular section of the class was considered essential by the researcher. Music was carefully selected for each class, aimed at providing inspiration, motivation and relaxation. The intensity of the cardiovascular section gradually increased throughout the eight weeks through use of higher resistance levels on the bikes, interval style sprints and climbing techniques. Strength exercises focused on training the pectorals, latissimus dorsi, deltoids, biceps and triceps. Exercises gradually increased in variety, intensity, and number of sets and repetitions over the eight-week program period.

After the cardiovascular segment of each class, the participants recorded their exercise heart rate. Additionally, participants were asked to complete an exercise log on a weekly basis in order to record their other physical activities throughout the week. At

the end of the eight-week cycling class program, participants were given the same three psychological assessment tests. All exercise logs were collected on a weekly basis, and final assessment tests were collected one week after completion of the eight week program.

Instruments

Three pre and post psychological assessment tests were administered to participants of the Recovery Cycle indoor cycling class at the beginning and end of an eight-week training period. These tests were: The Beck Depression Inventory (BDI); The State-Trait Anxiety Inventory (STAI); and the Rosenberg Self-Esteem Inventory (RSE). These standard psychological assessment tests had been administered in similar studies (Segar et al., 1998).

Beck Depression Inventory (BDI): This test measures levels of depression through a 21-item questionnaire and has demonstrated strong reliability and validity (Beck, Steer, Garbin, 1988). The questionnaire measures affective, cognitive, and somatic symptoms of depression (Beck, 1970). Each item consists of a group of statements ranging in severity from 0 to 3, and reflects a specific symptom of depression. Participants are to respond to each item in relation to how they have felt throughout the past week, including that day. Scores range from 0 to 63, with higher scores indicating stronger depressive symptoms.

State-Trait Anxiety Inventory (STAI): A condensed form of this test developed by Speilberger and Vagg (1984) was used. The state measure reflects how an individual is feeling at this moment, while the trait measure reflects how an individual generally feels. The questionnaire consists of eight items that describe dimensions of anxiety.

rate the degree to which the items describe their feelings on a scale of 1 (not at all) to 4 (very much). Higher scores in both state and trait measures indicate greater symptoms of anxiety.

Rosenberg Self-Esteem Inventory (RSE): A condensed form of this test was used, containing 10 items. Each item asks the respondent to rate his/her general feelings about him/herself, ranging from 1 (strongly agree) to 4 (strongly disagree). Responses reflect global self-evaluation of self-esteem, with higher scores indicating higher self-esteem (Segar, 1998). High levels of internal reliability ranging from $r = 0.76$ to $r = 0.87$ have been reported by Zemore & Shepel (1989) and Lewis & Bloom (1987) respectively.

Data Analysis

Main research variables were aerobic exercise, depression, anxiety, and self-esteem. Data were analyzed using a t-test. All the data were analysed at the $p < 0.05$ level of significance for each assessment test. Other factors to be measured included Recovery Cycle class attendance, average exercise heart rate of each participant per class, and average exercise expenditure based on the participant's exercise logs.

CHAPTER 3

RESULTS

The purpose of this research study was to examine the psychological effect of exercise on a group of breast cancer survivors. Psychological assessment tests administered before and after an eight-week indoor cycling program were used to determine levels of depression, anxiety and self-esteem.

This chapter presents an analysis of the data. Data were collected from five participants. The test scores of one participant were eliminated due to low attendance rate (below 50%) . The remaining participants maintained high attendance, with one participant at 100% attendance, two participants at 88% attendance, and the latter two participants at 75% and 63% respectively. Overall attendance averaged 83%.

Descriptive statistics, including the mean and standard deviation for each of the test results, are presented in Table 1.

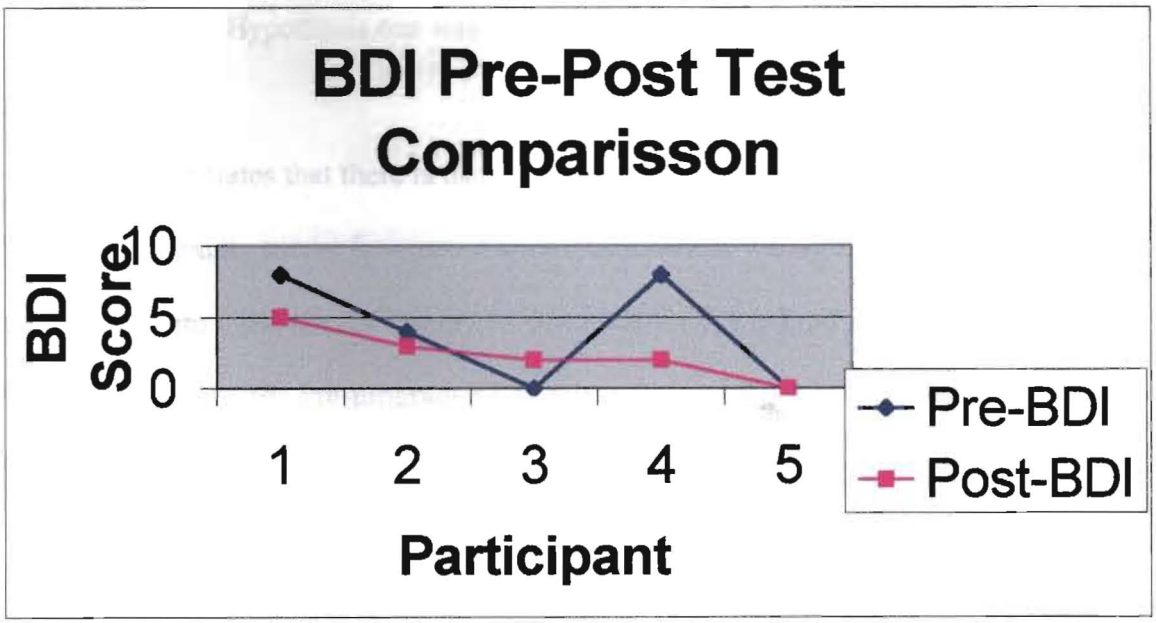
Hypothesis 1

Hypothesis one states that there is no difference between the pre test depression scores and post test depression scores for women with breast cancer who participated in an indoor cycling program. The measurement tool used was the Beck Depression Inventory (BDI). Results of the Pre-program BDI assessment tests revealed generally healthy psychological profiles for all participants. BDI scores were low, ranging from 0 to 8 ($M = 4.5$; $SD = 3.78$) out of a possible score of 63. BDI scores of 10 or lower are considered normal. Post-program test scores were generally lower than pre-test scores, ranging from 0 to 5 ($M = 2.4$; $SD = 1.81$).

Table 1: Descriptive Statistics for Pre/Post Psychological Assessment Tests

Participant Number	BDI Pre-Test	BDI Post-Test	STAI Pre-Test	STAI Post-Test	RSE Pre-Test	RSE Post-Test
2	8	5	19	12	31	36
5	4	3	12	11	40	39
6	0	2	9	8	40	40
8	8	2	13	13	33	33
9	0	0	10	9	38	40
Mean	**4**	**2.4**	**12.6**	**10.6**	**36.4**	**37.6**
Standard Deviation	**4**	**1.82**	**3.91**	**2.07**	**4.16**	**3.05**

Figure 1


BDI Pre-Post Test Comparisson
BDI Score
10
5
0
1
2
3
4
5
Participant
Pre-BDI
Post-BDI

The t-test analysis revealed that the lower scores were not significantly different ($t = 0.727$, $p = 0.05$). Hypothesis one was not rejected.

Hypothesis 2

Hypothesis two states that there is no difference between the pre test anxiety scores and the post test anxiety scores for women with breast cancer who participated in an indoor cycling program. The measurement tool used was the State-Trait Anxiety Inventory (STAI). Results of the Pre-program STAI assessment tests were between 9 and 19 ($M = 12.17$; $SD = 3.65$). The STAI results are measured in terms of population percentiles for men and women. The participant STAI scores were below the 50^{th} percentile mark for women, with the exception of the highest score of 19 at the 82^{nd} percentile. Post-program test scores were lower than pre-test scores, ranging from 8 to 12 ($M = 10.6$; $SD = 2.07$). T-test analysis revealed no significant difference ($t = 0.901$, $p = 0.05$). Hypothesis two was not rejected.

Hypothesis 3

Hypothesis three states that there is no difference between the pre test self-esteem scores and the post test self-esteem scores for women with breast cancer who participated in an indoor cycling program. The measurement tool used was the Rosenberg Self-Esteem Inventory. Results of the Pre-program RSE scores were high, ranging from 31 to 40 out of a maximum of 40. These scores suggest healthy levels of self-esteem ($M = 31 – 40$; $SD = 3.97$). High pre-test scores did not allow for a great deal of room for improvement on the post-tests. Post-test scores showed slight increases for those who were not already at the maximum score of 40, ranging from 36 to 40 ($M = 37.6$; $SD = 3.04$). However, one participant's score dropped from 40 to 39.

Figure 2

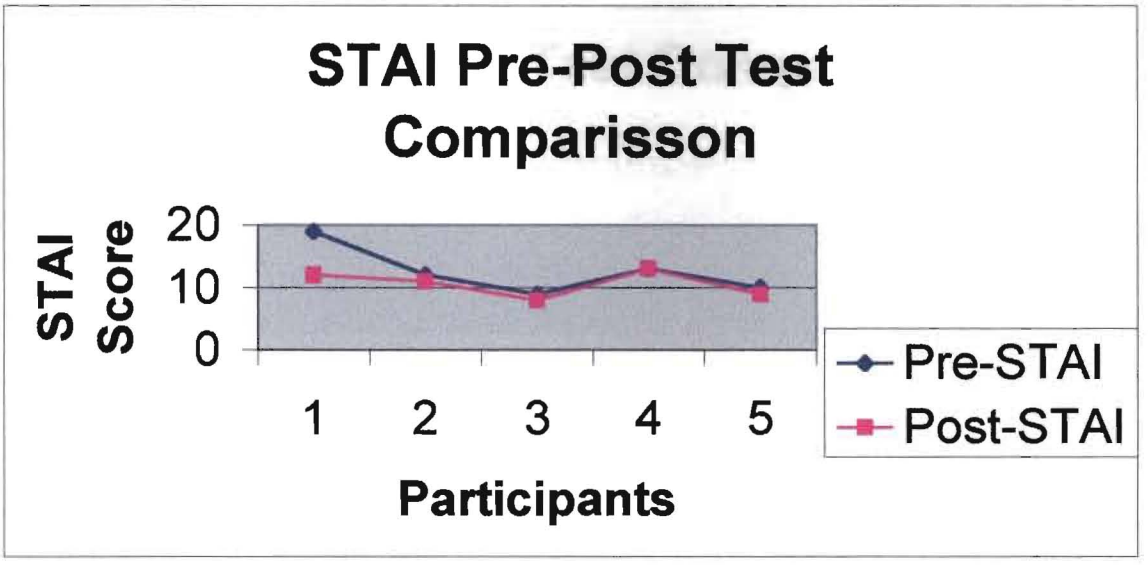
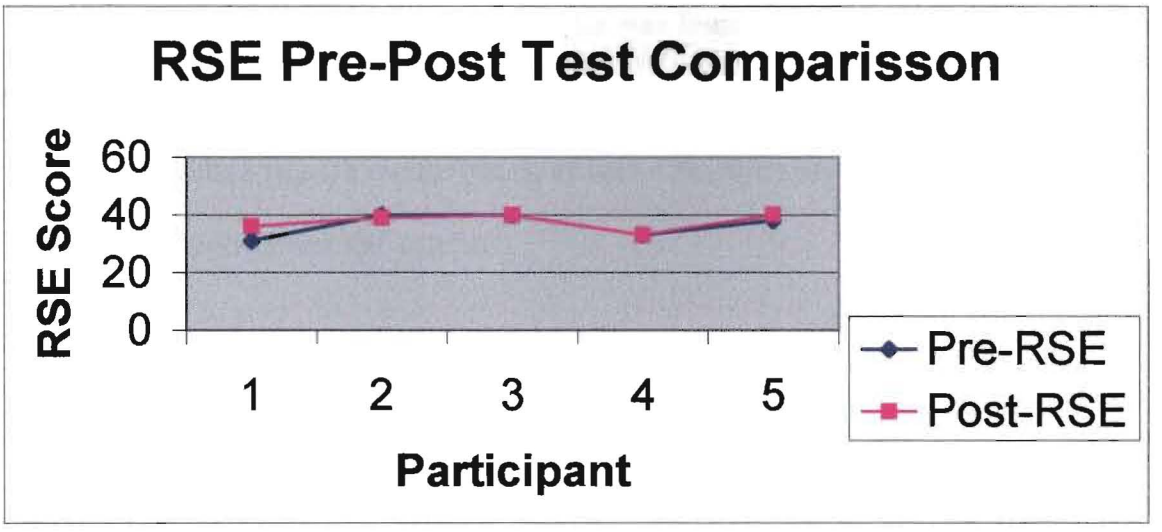

STAI Pre-Post Test Comparisson
STAI Score
20
10
0
1
2
3
4
5
Participants
Pre-STAI
Post-STAI

Figure 3


RSE Pre-Post Test Comparisson
RSE Score
60
40
20
0
1
2
3
4
5
Participant
Pre-RSE
Post-RSE

Again, these differences in pre- and post-test scores were analysed using a t-test ($t = -0.465$, $p = 0.05$). No significant difference was found. Hypothesis three was not rejected.

The results suggest exercise has no effect on the three psychological parameters of depression, anxiety and self-esteem.

CHAPTER 4

DISCUSSION

Summary of Purpose and Findings

The purpose of this research study was to examine whether women in a rehabilitation stage of breast cancer would experience decreased levels of anxiety and depression and increased levels of self-esteem after an eight-week indoor cycling program. Previous research suggests aerobic exercise intervention can improve the psychological well-being of breast cancer survivors. This research study supports the literature, in finding an eight-week indoor cycling program may have been a factor in creating a change in test scores measuring depressive and anxiety symptoms, and self-esteem levels of participants. Although the differences in test scores were not statistically significant, this may well have been due to several limiting factors of the study.

Small sample size was a definite limitation of this study. Despite extensive advertising and promotion efforts, registration for the specialty indoor cycling class was low. Lack of a control group was another weakness. A control group in any pre/post research methodology usually increases the validity and strength of a study. However, the variety of reasons as to why a breast cancer survivor may not be exercising regularly may have reduced the validity of his/her psychological assessment scores (i.e. under doctor's recommendations not to engage in physical activity; higher doses of medications; lack of access, etc.). Additionally, the pre-test scores indicated participants already had relatively high quality of life (QOL) profiles, making drastic increases to QOF measures unlikely.

The long time span of being post-treatment may have also reduced the degree of psychological reaction to the exercise intervention. Participants had been post-treatment for an average of 4.5 years. Similarly, most of the participants had already been exposed to the indoor cycling program for several months, which may have also served to lessen their degree of any psychological response. A common argument against the pre/post methodology of research is the possibility of participants becoming sensitized to the tests after the initial pre-program exposure. The researcher made no indication of what she hoped or expected to find throughout the program and testing periods. Lastly, more control and stricter guidelines in terms of exact exercise protocol would have served well in order to standardize the recommended amounts and intensities of exercise for this population.

Other dependent variables of this study were the average ratings of perceived intensity and training heart rate, and any additional forms of physical activity engaged in during the eight week cycling program. Participants were asked to rate the intensity of the class as "easy", "moderate" or "hard". The rating of perceived intensity of the class was most often rated as "moderate" by participants, with an occasional "hard" rating. Several participants commented on how they were able to increase the workload on the bikes over the course of the 8-weeks in order to achieve similar training heart rate and perceived intensity levels. Despite providing participants with the recommended training heart rate range of 60-80%, actual training heart rates during the class were surprisingly high, ranging on average from 64% to 90% of age predicted maximum.

As for the additional physical activity engaged in by participants above and beyond the cycling class, the group maintained a fairly active lifestyle by participating in

other physical activities on a consistent basis. On average, participants engaged in brisk walking twice per week for 30-60 minutes at easy to moderate intensity levels. One participant in particular was training for her first triathlon, and performed two 30-minute runs and two additional cycling classes at moderate to hard intensities throughout the week. Other activities among the group were golfing, skiing, swimming, stretching, occasional use of cardio machines (such as a treadmill or cross-trainer), and moderate weight training. These activities were generally performed one-two times per week.

Future Research

Despite the lack of statistically significant differences in pre to post program test scores, it is clear that moderate differences occurred through changes in mean and standard deviation values. This suggests that breast cancer survivors who engage in regular physical activity can improve their psychological health, as reflected by measured lowered depressive and anxiety symptoms and increased levels of self-esteem. As treatment of breast cancer improves and the number of cancer survivors increase, their quality of life after treatment continues to be an issue that needs to be addressed by both medical and fitness professionals. Aerobic and strength training appears to be a highly beneficial aspect of an active recovery process, warranting further research and support from both the medical and fitness communities.

Those breast cancer survivors who stand to benefit most from a post-rehabilitative exercise program are those in the first year of rehabilitation after the cessation of chemotherapy and radiotherapy treatment. According to participants of the Recovery Cycle class in this particular study, it is at this stage (climaxing at 1-year post-treatment) where one fears recurrence the most and feels they are not actively fighting the disease,

thus depressive and anxiety symptoms tend to take hold. Additionally, an exercise program for women who have not yet used physical activity as part of their rehabilitation program are likely to experience greater psychological change.

A place for these women to meet, exercise, interact and simply have fun was another important factor that participants viewed as essential to good psychological health. Many had experienced support groups and said they quickly tired of talking about the cancer. Having an activity on which to focus was viewed as much more effective in terms of staying positive and getting through the recovery process. One Recovery Cycle participant stated: "It's nice to know people are here if you need to talk; but it's also nice to know that there are plenty of other things to talk about." Future exercise/psychological parameter research needs to be done on women at the 1-year post-treatment mark to assess the truest extent of the benefit of exercise on the psychological health of breast cancer survivors.

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APPENDICES

Appendix A: Permission to Conduct Study

EMPORIA STATE UNIVERSITY

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GRADUATE STUDIES AND RESEARCH
RESEARCH AND GRANTS CENTER
Campus Box 4003

January 17, 2001

Ingrid Knight-Cohee
c/o Rainy Kent, Cameron Recreation Complex
9523 Cameron Street
Burnaby, BC, Canada V3J 1L6

Dear Ms. Knight-Cohee:

The Institutional Review Board reviewed your application for approval to use human subjects, entitled "The Psychological Affect of Exercise on Breast Cancer Rehabilitation Patients." I am pleased to inform you that your application was approved and you may begin your research with subjects as outlined in your application materials.

On behalf of the Institutional Review Board, I wish you luck with your research project. If I can help you in any way, do not hesitate to contact me.

Sincerely,

Timothy M. Downs, Ph.D.
Dean, Graduate Studies and Lifelong Learning

pf

cc: Kathy Ermler

Appendix B: Informed Consent Forms

EMPORIA STATE UNIVERSITY

INFORMED CONSENT DOCUMENT

The Division of Health Physical Education and Recreation at Emporia State University supports the practice of protection for human subjects participating in research and related activities. The following information is provided so that you can decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time, and that if you do withdraw from the study, you will not be subjected to reprimand or any other form of reproach.

The procedures of this study involve the administration of three psychological assessment tests that are to be completed both before and after participation in a weekly indoor cycling class program. The duration of the study and exercise program will be 8 weeks. Participants will also be asked to complete an exercise log at the beginning of every class in order to record weekly exercise activities. Exercise heart rate will be recorded at the end of the cardiovascular segment of each class.

Potential discomforts resulting from participation in this study may be initial muscle soreness and fatigue from indoor cycling and strength training. The risk of lymphedema is also a concern for many breast cancer survivors. Please note that no direct link between exercise and lymphedema has been proven. In a study of 25 breast cancer survivors participating in a rigorous dragon boating training regimen, not one woman experienced increases in arm circumference (McKenzie, 1996). However, participants will constantly be reminded of safety precautions and encouraged to modify exercise intensity at their discretion.

The benefits to be expected from participation in this study are improved cardiovascular fitness, muscular endurance and strength. Additionally, participants stand to gain an increased awareness of their psychological health status.

"I have read the above statement and have been fully advised of the procedures to be used in this project. I have been given sufficient opportunity to ask any questions I had concerning the procedures and possible risks involved. I understand the potential risks involved and I assume them voluntarily. I likewise understand that I can withdraw from the study at any time without being subjected to reproach."

_____ _____

Subject Date

PERMISSION TO COPY STATEMENT

I, Ingrid C. Knight-Cohee, hereby submit this thesis to Emporia State University as partial fulfillment of the requirements for an advanced degree. I agree that the Library of the University may make it available to use in accordance with its regulations governing materials of this type. I further agree that quoting, photocopying, or other reproduction is allowed for private study, scholarship (including teaching) and research purposes of a non-profit nature. No copying which involves potential financial gain will be allowed without written permission of the author.

I Knight Cohee
Signature of Author

July 17/2001
Date

The Psychological Effect
of Exercise on Breast Cancer
Survivors
Title of Thesis

Signature of Graduate Office Staff

August 6, 2001
Date Received