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The Effects of Aerobic and Resistance Training on Mood State and Self-Esteem in Cardiac Rehabilitation

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by

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Dedication

To my parents, Glynn and Anne Lee, for supporting and nurturing me throughout life's challenges. All of your hard work and sacrifice has paid off for both of your children. I owe all of my success to you and hope to some day be able to repay you.

To my big sister, Lynda, and brother-in-law, Doug, for always giving me advice when I desperately needed it. You have been wonderful role models for me.

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To the Bonacci's, for always providing a listening ear.

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Abstract

The primary purpose of this study was to investigate the effects of exercise training, aerobic and a combination of aerobic and resistance, on mood state and self-esteem in a sample of cardiac rehabilitation patients. A secondary purpose was to examine the influence of activity level on the psychological benefits received from the training programs. This study was conducted in a pretest/post-test format over an eight week period. Ten phase III participants (male = 9 and female = 1) volunteered from four cardiac rehabilitation centers in Georgia for participation in this study. Each participant read and signed an informed consent form prior to any data collection. All participants were involved in either an aerobic training program or a combination of aerobic and resistance training program. The Profile of Mood States (POMS) was used to determine changes in mood state with the implementation of a training program and the Rosenberg Self-esteem Scale (RSE) was used to assess changes in self-esteem. A single item activity inventory was used to determine activity level of each participant outside of the cardiac rehabilitation program for the four months prior to the study. No observable differences were found between aerobic and combination training groups for any of the self-esteem and mood variables. There were also no observable differences between the active and inactive groups for any of the variables. Not all participants reported improvements for each variable, but none had decrement in mood or self-esteem score. All participants reported increased vigor and decreased total mood disturbance. The

results of this study suggest that aerobic training and a combination of aerobic and resistance training are beneficial for improving self-esteem and mood state in a cardiac rehabilitation population.

Table of Contents

Tables

Figures

Introduction

Cardiac Rehabilitation

Cardiac rehabilitation is a major type of treatment for individuals who have had a myocardial infarction, angioplasty, or coronary artery bypass surgery, as well as for those with stable angina and significantly reduced exercise capacity. The central component of these programs is prescribed, individualized physical activity regimens to improve exercise capacity and restore patients' functional ability (Goldberg, 1989). Other clinical outcomes can include a reduction in cardiovascular morbidity and mortality, and increases in physical working capacity, improved clinical status, enhanced return-to-work or self-care status, and reductions in anxiety and depression (Haskell, 1994).

Aerobic exercise training is the most commonly used training mode in the rehabilitation process (Faigenbaum, Skrinar, Cesare, Kraemer, & Thomas, 1990; Daub, Knapik, & Black, 1996). Training of this type incorporates regular, physical exercise involving large muscle groups and has been shown to enhance cardiovascular function (Daub, Knapik, & Black, 1996). Aerobic conditioning improves a patient's functional capacity and results in a reduction of the rate-pressure product (Blumenthal, Emery, & Rejeski, 1988). Recently, resistance training has also been implemented into some cardiac rehabilitation programs in conjunction with aerobic training (Stewart, 1989; Sword, 1992; Daub et al., 1996; Faigenbaum & Beniamini, 1997).

Resistance Training

Resistive exercise has become an increasingly popular form of training because of its ability to increase muscle mass and strength, and decrease body fat (Goldberg, 1989). Until recently, these benefits have been primarily demonstrated in healthy individuals (McKelvie & McCartney, 1990). With the introduction of resistance training into cardiac rehabilitation programs, much controversy has risen concerning issues including cardiac responses, cardiac benefits, patient safety, and psychological benefits.

Cardiac Responses

In the past, individuals with cardiovascular diseases, such as coronary artery disease or hypertension, have been discouraged from participating in any form of resistance training (Harris & Holly, 1987; Butler, Beierwaltes, & Rogers, 1987) because of the threat of myocardial ischemia and arrythmias (Stewart, 1989; Sword, 1992). However, recent studies suggest that there are considerable benefits and low risk with strength training in selected cardiac patients (Featherstone, Holly, & Amsterdam, 1993; Faigenbaum & Beniamini, 1997). Faigenbaum and Beniamini (1997) also suggest that strength training and testing should become part of selected patients' programs whose daily activities require lifting.

Cardiac Benefits

Until recently, resistance training programs have been criticized for their lack of observed cardiovascular benefits (Harris & Holly, 1987). However, Sword (1992) and Kelley (1997) found that systolic and diastolic blood pressure responses during resistance training were similar to those during aerobic training and decreases were also recorded for both. Aerobic exercise was highly regarded as the most valuable means of improving cardiac function and reducing the significance of risk factors (Goldberg, 1989; Faigenbaum et al., 1990). Based on these findings, both aerobic training and resistance training may be equally important for improving cardiac function.

It is well established that resistive exercise causes cardiac hypertrophy, specifically within the left ventricle (LV), so caution has been stressed for those who may already have cardiac hypertrophy secondary to hypertension (Stewart, 1989). However, Franklin, Bonzheim, Gordon, and Timmis (1991) and Stewart, McFarland, Weinhofer, Cottrell, Brown, and Shapiro (1998) found that LV function remained stable during exercise and concluded that resistive exercise was safe for patients with an uncomplicated MI. Although resistance exercise has been shown to be safe for most cardiac conditions, physical safety remains an issue of controversy.

Patient Safety

In the past, most cardiac rehabilitation programs emphasized the use of machines rather than free weights because they were considered safer (Kelemen, 1989). However, more recent studies suggest that patient safety should no longer be a concern whether using free weights or machines (Daub et al., 1996; Faigenbaum & Beniamini, 1997; Maiorana et al., 1997; Stewart et al., 1998). In response to the idea that resistance training may be too strenuous for this population, Franklin et al. (1991) and Ghilarducci, Holly, and Amsterdam (1989) identified no safety concerns with cardiac patients lifting between 40-80% of their one repetition maximum.

Psychological Benefits

The psychological benefits of resistance training in cardiac rehabilitation are largely inconclusive. Both aerobic and resistance training has been shown to increase self-confidence and self-esteem, improve mood, and decrease anxiety (Caruso & Gill, 1992; Denollet & Brutsaert, 1995). A study by Beniamini, Rubenstein, Zaichkowsky, and Crim (1997) stated that the improvements in strength during resistance training were responsible for the improved mood. These studies suggest that self-esteem and mood may be important psychological factors for patients involved with resistance training in cardiac rehabilitation programs.

Self-esteem is represented by the statement, "how I feel about how I see myself" (Kohr, Coldiron, Skiffington, Masters, & Blust, 1988, p.467). Individuals with low self-esteem are characterized as passive, shy, tense, and self-conscious, whereas high self-esteem individuals are viewed as happy, socially independent, creative, and psychologically healthy (Raymore, Godbey, & Crawford, 1994). Rosenberg (1965) suggests that self-esteem may influence choices to become involved in leisure activities. Self-esteem has also been identified as the psychological variable with the most potential to benefit from regular exercise (Caruso & Gill, 1992).

Oldridge, Streiner, Hoffman, and Guyatt (1995) classify mood as "typical and persistent reactions to current life situations" (p. 900). They consider current mood states as transient and responsive. Oldridge et al. (1995) also state that patients' perceptions of health and well-being have been shown to be important to the effectiveness of clinical intervention. Many patients become anxious and depressed following cardiac trauma. Their mood may be transient or long term depending upon the outcome of cardiac rehabilitation. Beniamini et al. (1997) suggest that "changes in mood are mediated by self-efficacy rather than actual physical function" (p. 841).

Based on previous research that was collected, more research into patient self-esteem an mood state is warranted, especially with the implementation of resistance training. Further research will aid in improving these psychological variables, and thus, allow patients to benefit more from the rehabilitation process.

Purpose of this Study

Since the implementation of resistance training into cardiac rehabilitation programs, few research investigations have focused on the psychological effects on patients involved in a strength training program (Ewart, 1989; Caruso & Gill, 1992; Beniamini et al., 1998). The primary purpose of this study was to describe the effects of exercise training, aerobic and a combination of aerobic and resistance, on mood state and self-esteem in a sample of cardiac rehabilitation patients. A secondary purpose was to examine the influence of self-reported activity level on the psychological benefits received from the training programs.

Methods

Design

This study was conducted in a pretest/post-test format over an eight week period of aerobic and a combination of aerobic and resistance training as part of a cardiac rehabilitation program. The study was initially designed to be quantitative, but due to a low number of participants, the design was shifted to be more qualitative. The participants selected for this study had completed phase II (ACSM, 1995) of the rehabilitation process. All responses were made anonymously so that patient identification remained confidential. Both males and females were eligible for the study. All procedures were approved by the Institutional Review Board at Georgia Southern University.

Participants

The participants came from four cardiac rehabilitation facilities in the state of Georgia. These facilities were chosen as a convenience sample to improve compliance. These facilities included Satilla Cardiac and Pulmonary Rehabilitation in Waycross, Bacon County Hospital in Alma, Emory Heart Wise in Atlanta, and Columbia Eastside Medical Center in Snellville. The facility supervisor at each site was contacted and asked whether their rehabilitation center incorporated both resistance training and non-resistance training into their programs. Eligible participants volunteered for the study after the supervisor briefly explained the design of the study. All participants read and signed an informed consent prior to any data collection. Participants were either exclusively performing aerobic exercise or performing a combination of aerobic and resistive exercise. Participants in aerobic training exercised 2-3 times per week for 40- 60 minutes each session using a variety of aerobic equipment, including stationary bikes, treadmills, rowers, and stair climbers. Along with a similar aerobic training program, combination training participants exercised 2-3 times per week for a total of 60-120 minutes each session. Most facilities primarily used a circuit training protocol, with all of the facilities targeting 8 major muscle groups. Only participants attending at least 80 % of the sessions during the 8 week period were eligible for inclusion into the study.

Instruments

There were two questionnaires used for the psychological assessment. The Profile of Mood States (POMS) (1971) was used to determine the changes in mood state with the implementation of a resistance training program. The POMS focuses on six mood variables including vigor, tension, depression, anxiety, fatigue, and confusion. Test-retest reliability scores range from r=.65 to r=.74 for the POMS. The Rosenberg Self-Esteem Scale (RSE) (Rosenberg, 1965; 1989) was used to assess the changes in self-esteem with the implementation of the resistance training program. Test-retest reliability scores are reported at r=.85 for the RSE. A personal information page also accompanied the questionnaires for obtaining demographic data. A single item inventory by Godin (1985) also accompanied the information page. This inventory determined the activity level of each patient outside of the cardiac rehabilitation program for the four months prior to the study to provide insight into the participants' lifestyles at home. Responses to the inventory could have been between one and six, with one stating "not at all" and six stating "3 or more times a week." Responses five and six were classified as "active" and responses one through four were classified as "inactive."

Procedures

The facility supervisors were familiarized with the study and asked if they would like to participate. A packet was then sent to each facility including a timeline and list of dates to help with data collection. Close contact was kept with each center supervisor on a bi-weekly basis over the 8-week period using e-mail, phone, and letters to assure the consistency with data collection. A trip was made to each facility to discuss all aspects of the study with the program supervisors and to tour the facilities. Specific guidelines were provided for each facility supervisor to avoid any variation about how the study was to be conducted.

The questionnaires were administered to the patients by the center supervisor or other selected staff member before their phase III programs began. The questionnaires were completed on a scheduled workout day before patients began their daily workout, so as not to interfere with their routine. After the initial questionnaires were completed, they were mailed back to the researcher in a self-addressed stamped envelope. After 8 weeks of participating in their respective programs, participants completed the questionnaires using the same procedure as described above.

Analysis

Data responses were analyzed using SPSS (Version 7.5). There were eight dependent variables: self-esteem (RSE), tension, depression, anger, fatigue, confusion, vigor, and total mood disturbance (TMD) (POMS). All data scores were reported as raw data, means, standard deviations, and delta scores (post-score - pre-score).

Results

A total of 12 participants from four cardiac rehabilitation facilities began the study. Two participants discontinued their rehabilitation programs, leaving a total of 10 participants (9 males and 1 female). Five of the participants were retired and five were employed. Five participants were involved in an aerobic training program and five participated in a combination training program. Among the ten participants, four were classified as inactive outside of their rehabilitation programs and six were classified as active. There were no injuries or cardiac complications reported throughout the eight weeks.

Group demographics appear in Table 1. Delta scores (post - pre) for changes in POMS and RSE appear in Table 2 and Table 3, respectively. Negative scores indicate improvement for tension, depression, anger, fatigue and confusion, whereas positive scores represent improvement for vigor. Individual descriptions appear below.

Participant #1 was a 73-year old male who had suffered an aneurysm and stroke. He was considered inactive outside of rehabilitation and participated in aerobic training. He showed improvements in all of the variables except one, tension, in which he remained the same. His largest improvements were in depression (-11.00), anger (-9.00), fatigue (-8.00), confusion (-6.00), vigor (8.00), and TMD (-42.00). He improved by at least 5.00 in all of these variables. Compared to the other patients, his TMD delta score (-42.00) was the highest.

Participant #2 was a 81-year old male who had a previous MI. He was considered inactive and participated in combination training. He showed improvements in five of the eight variables. Self-esteem remained the same and fatigue and confusion increased by 1.00. His largest improvements were in depression (-6.00), anger (-5.00), and TMD (-14.00).

Participant #3 was a 59-year old male who had previously had bypass surgery. He was considered active and participated in aerobic training. He improved in seven of the eight variables. Self-esteem decreased by 1.00. His largest improvements were in tension (-5.00), fatigue (-6.00), and total mood disturbance (-20.00).

Participant #4 was a 65-year old female who had been diagnosed with congestive heart failure. She was considered active and participated in aerobic training. She improved in six of the eight variables. Tension increased by 1.00 and fatigue remained the same. Her largest improvements occurred in self-esteem (-5.00) and total mood disturbance (-10.00).

Participant #5 was a 63-year old male who had previously had valve replacement surgery and had been diagnosed with Chronic Obstructive Pulmonary Disease (COPD) and arthritis. He was considered active and participated in combination training. He showed improvement in six of the eight variables. The depression and fatigue scores remained the same. His largest improvements were in self-esteem (-9.00), fatigue (-10.00), and total mood disturbance (-19.00).

Participant #6 was a 54-year old male who had previously had an MI and bypass surgery. He was considered active and participated in combination training. He showed improvement in six of the eight variables. Anger increased by 1.00 and fatigue increased by 2.00. His largest improvement was in self-esteem (-6.00).

Participant #7 was a 50-year old male who was diagnosed with heart disease, Percutaneous Transluminal Angioplasty, and had received a stent in the Fall of 1998. He was considered active and participated in combination training. He showed improvement in seven of the eight variables. Self-esteem remained the same. His largest improvements were in depression (-5.00), vigor (7.00), and TMD (-22.00).

Participant #8 was a 49-year old male who had received angioplasty and stent replacement surgery. He was considered active and participated in combination training. He showed improvements in seven of the eight variables. Self-esteem decreased by 1.00. His largest improvements were in vigor (6.00) and TMD (-18.00).

Participant #9 was a 55-year old male who was diagnosed with a status/post cardiac arrest, complete block, and had a dual chamber pacemaker. He was considered inactive and participated in aerobic training. He showed improvements in six of the eight variables. Tension remained the same and confusion increased by 1.00. He did not show large improvements (>5.00) in any of the variables.

Participant #10 was a 57-year old male who was diagnosed with stable angina, single vessel disease with 100% occlusion, and hypertension. He was classified as inactive and participated in aerobic training. He improved in seven of the eight variables. Self-esteem remained the same. His largest improvements were in tension (-5.00), depression (-6.00), and TMD (-23.00).

Overall, for the POMS variables, all ten participants had improved vigor (M=+4.22, SD=2.40) and had improved TMD (M=-17.60, SD=10.45). Seven of the ten participants reported improvement in tension (M=-3.57, SD=1.05). Two subjects remained the same and one subject increased for tension. Nine of the ten participants improved in depression (M=- 4.33, SD=2.98) with one subject remaining the same. For anger, eight of the ten participants reported improvement (M=-3.50, SD=2.39). One participant remained the same and one participant increased for anger. For fatigue, seven participants improved (M=-4.71, SD=3.10). One participant remained the same and two participants increased. Eight of the participants showed improvement for confusion (M=-2.63, SD=2.48). Two participants reported slight increases for confusion. Individual POMS results appear for all participants in Figures 1-7.

Five of the ten participants improved their RSE score (M=-5.00, SD=2.45). Three participants reported no change in self-esteem and two participants reported a slight decrease in self-esteem. Participant RSE scores appear in Figure 8.

The improvements for the aerobic training group included tension (M=-1.8, SD=2.95), depression (M=-4.8, SD=3.96), anger (M=-3.8, SD=3.03), fatigue (M=-3.6, SD=3.36), confusion (M=-2.4, SD=2.61), vigor (M=3.6, SD=2.88), TMD (M=-19.8, SD=14.57), and self-esteem (M=-1.8, SD=2.39). The improvements for the combination group included tension (M=-3.0, SD=0.07), depression (M=-3.0, SD=2.55), anger (M=-1.6, SD=2.41), fatigue (M=-2.4, SD=4.72), confusion (M=-1.4, SD=1.67), vigor (M=4.0, SD=2.45), TMD (M=-15.4, SD=6.99), and self-esteem (M=-2.8, SD=4.44).

The improvements for the inactive group included tension (M=-2.25, SD=2.63), depression (M=-6.25, SD=3.69), anger (M=-4.5, SD=3.32), fatigue (M=-2.75, SD=3.86), confusion (M=-1.75, SD=3.40), vigor (M=3.5, SD=3.32), TMD (M=-20.75, SD=16.15), and self-esteem (M=-1.25, SD=1.50). Improvements for the active group included tension (M=-2.5, SD=1.97), depression (M=-2.33, SD=1.97), anger (M=-1.50, SD=1.87), fatigue (M=-3.17, SD=4.31), confusion (M=-2.00, SD=1.10), vigor (M=4.00, SD=2.19), TMD (M=-15.50, SD=6.98), and self-esteem (M=-3.0, SD=4.24).

Discussion

The main finding from this study was a variety of changes in mood state and self-esteem for all participants, with most of these positive. Although there were not improvements for all variables, the unimproved variables remained the same as the pre-intervention score. None of the post-intervention scores suggested that either training program had any adverse effect on participants' mood or self-esteem.

Pre-intervention self-esteem scores were from the mid-range (25) to high self-esteem (11) with forty as the lowest possible score and ten as the highest. Because pre-intervention scores were on the high end of the spectrum there was little room for improvement. One investigation enrolled participants with moderate to severe psychosocial disturbances so that the results of their findings would show a large amount of change from pre-to post-intervention (Shephard, Kavanagh, & Klavora, 1985). Studies that had participants with mid-range scores tend to show less change (Taylor et al., 1986; Blumenthal et al., 1988). The present study involved patients who already had relatively high pre-intervention scores for mood and self-esteem. The participants in the present study were selected based on eligibility not psychological state, so their pre-intervention scores were mid-range by chance. Although there were not large group changes from pre-to post-intervention, one of the aerobic training participants improved from a normal range score to the highest possible score for self-esteem.

The majority of mood variables improved for each participant. The participants reported mid-range scores for mood variables except for two participants who reported higher than normal scores for the negative mood dimensions (tension, depression, anger, fatigue, and confusion) and lower scores for vigor compared to mood scores of cardiac patients from data collected in a previous study by Morgan and Pollock (1978). Both vigor and total mood disturbance improved for all ten participants. The improvements in vigor, which is the positive dimension of the POMS scale, suggest that patients feel more cheerful and lively and have more energy as a result of their exercise program (McNair, Lorr, & Droppleman, 1971). Overall improvement in total mood disturbance suggests that even though there were not large improvements in single mood variables, there were improvements in the participants' overall mood state.

Other studies have found similar results with improvement in total mood disturbance without finding improvements for each individual mood variable (Shephard et al., 1985; Oldridge et al., 1995; Beniamini et al., 1997; Engebretson et al., 1999). In a study involving 317 post-MI patients, Shephard et al., (1985) found significant improvements in five of the six mood variables with fatigue showing no change from pre-to post testing. Beniamini et al., (1997) found significant effects for strength training on depression, fatigue, and total mood disturbance dimensions and trends for decreasing tension and anger dimensions in a study involving 38 cardiac patients (men=29, women=9). Oldridge et al. (1995) previously reported improvements in tension, depression, vigor, anger, and confusion dimensions in 187 male patients with mild to moderate anxiety/depression scores after completing eight weeks of aerobic exercise. Engebretson et al. (1999) reported significant improvements in tension, depression, confusion, vigor, and total mood disturbance for 53 phase II patients after 12 weeks of aerobic exercise. These studies looked at either resistance or aerobic training programs or both as did the current study and reported similar findings with no clear differences between the modes of exercise.

Both groups of aerobic and combination training began with similar pre-intervention scores for mood and self-esteem. Based on the results, there were no clear differences between group improvement for either of the mood or self-esteem scales. Both groups showed similar improvements for each of the variables. Participants reported no detrimental effect on vigor or fatigue with the addition of a resistance training program. One aerobic training participant's score showed large improvement and thus, skewed the overall group improvement. Overall, there were consistent improvements for both aerobic and combination training groups for TMD and vigor. This suggests that both training programs improve these mood variables.

There were no noticeable trends in changes in self-esteem and mood state between those classified as active or inactive prior to the beginning of the study. Both groups began at pre-intervention with similar scores for self-esteem and mood and improved similarly for each of the testing variables. There were consistent improvements for vigor, confusion, and tension scores between the active and inactive groups. One factor that may have impacted these results was the method by which activity was reported. Patients were classified as active and inactive based on how often they participate in vigorous physical activity, not on other quantifiable characteristics of physical activity such as mode or duration. Therefore, there may have been an error in the classification of activity groups. No other research focusing on participant activity level outside of cardiac rehabilitation could be found for comparison.

In summary, each individual participant progressed through their respective programs with a variety of improvements, the most evident being improved total mood disturbance with only half reporting improved self-esteem. These findings suggest that persons may benefit from rehabilitation programs differently. The only variables in which all of the patients reported improvement were vigor and total mood disturbance.

The generalizability of the results is hindered by the sample and design. The results of this study are clearly limited by a small sample population. A larger sample may have included participants with lower pre-intervention self-esteem and mood dimension scores that had more opportunity for change over the course of the 8 week study. Due to the small sample, there was not much diversity among the participants. All of the participants were Caucasian, and only 1 female was included. A shift from a quantitative approach to a more qualitative design was necessary to compensate for the sample size.

The length of the program may have been a factor for finding individual psychological dimension improvements, since a longer more intense program (e.g., 12-16 weeks) may be needed to produce the desired changes in self-esteem (Caruso & Gill, 1992). In addition, individual personality characteristics, including self-perception, may play an important role in self-esteem scores (Caruso & Gill, 1992). Self-perception was not measured within this study. There was also no control of mood altering drugs or other medications that the participants may have been using during the study.

Non-randomization of the cardiac facilities may have also impacted the results. Different facilities were used to obtain the data, therefore, the variety of the exercise programs and personnel may have influenced the results. For example, a facility that has a more hospital-based atmosphere compared to a facility that takes a more relaxed, fitness center approach. The influence of conditioning was accounted for by using participants at the beginning of phase III. There may have been existing differences in exercise conditioning beyond the rehabilitation program.

In conclusion, this study demonstrated that the rehabilitation process can impact self-esteem and overall mood state whether individuals are participating in aerobic training or a combination of aerobic and resistance training. There was no evidence obtained from this study to suggest that an exercise program could be detrimental to perceived self-esteem or total mood disturbance. There were similar changes reported for both aerobic and combination training groups for all variables. There were also similar changes reported for the active and inactive groups for all variables. Based on the results of this study, both aerobic and a combination of aerobic and resistance training were shown to be beneficial for improving both self-esteem and mood state in a cardiac rehabilitation population. However, further investigation is warranted.

In order to better describe the influences of different exercise programs on mood state and self-esteem, future studies should investigate participants with a variety of cardiac diagnoses to examine the effect that cardiac complications and disease state can have on psychological measures. These studies should be conducted for a period of at least 12-16 weeks based on similar research designs to better evaluate the time element involved in changing self-esteem and mood. The exercise or training programs should be standardized for the study so that all of the participants receive the same rehabilitation by using a single facility. Also, implementing a more qualitative design which would provide a more in depth evaluation of mood state and self-esteem and more clearly characterize individual changes.

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Table 1
Participant Demographics (N = 10)

Variable	M	SD	Min	Max
Age(yrs)	60.6	10.18	49	81
Weight(lbs)	201.8	29.21	168	243
Height(in)	70.8	2.73	65	74

Note. Participants included 9 males, 1 female. All were Caucasian.

Table 2

Participant Changes in POMS Variables (Post - Pre)

Participants	Ten	Dep	Ang	Fat	Con	Vig
1	0.00	-11.00	-9.00	-8.00	-6.00	8.00
2	-4.00	-6.00	-5.00	1.00	1.00	1.00
3	-5.00	-1.00	-4.00	-6.00	-3.00	1.00
4	1.00	-4.00	-2.00	0.00	-1.00	4.00
5	-3.00	0.00	0.00	-10.00	-3.00	3.00
6	-2.00	-1.00	1.00	2.00	-1.00	3.00
7	-3.00	-5.00	-1.00	-3.00	-3.00	7.00
8	-3.00	-3.00	-3.00	-2.00	-1.00	6.00
9	0.00	-2.00	-2.00	-1.00	1.00	1.00
10	-5.00	-6.00	-2.00	-3.00	-3.00	4.00

Note. For tension (Ten), depression (Dep), anger (Ang), fatigue (Fat), and confusion (Con), a negative delta score represents improvement and a positive delta score represents decrement. For vigor (Vig), a positive delta score represents improvement and a negative delta score represents decrement.

Table 3

Participant Changes in RSE and TMD (Post-Pre)

Participants	RSE	TMD
1	-3.00	-42.00
2	0.00	-14.00
3	1.00	-20.00
4	-5.00	-10.00
5	-9.00	-19.00
6	-6.00	-4.00
7	0.00	-22.00
8	1.00	-18.00
9	-2.00	-4.00
10	0.00	-23.00

Note. A negative delta score represents improvement for RSE and TMD. A positive delta score represents decrement for RSE and TMD.

Figure 1. Changes in tension for participants 1-10. An increase in score represents decrement for tension. A decrease in score represents improvement for tension.

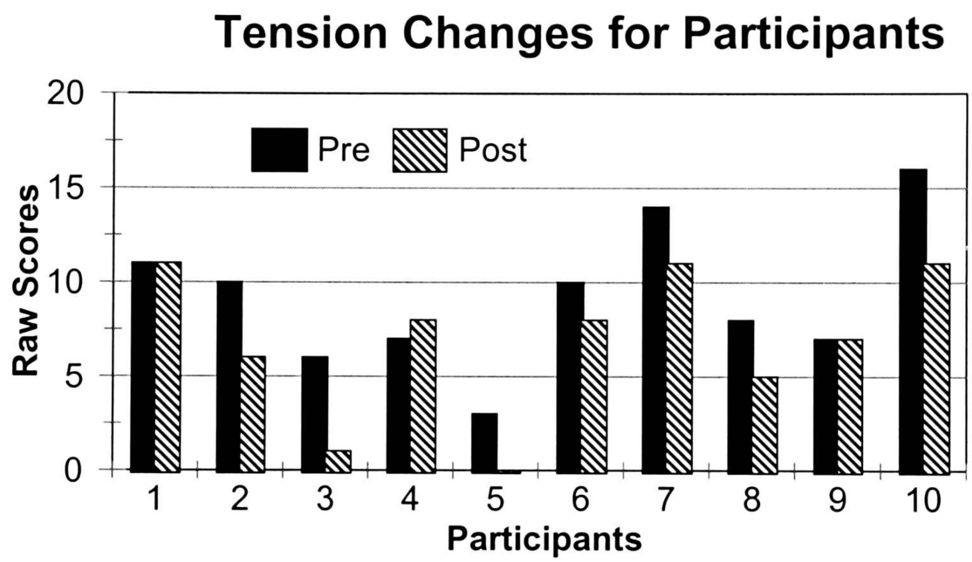


Figure 2. Changes in depression for participants 1-10. An increase in score represents decrement for depression. A decrease in score represents improvement for depression.

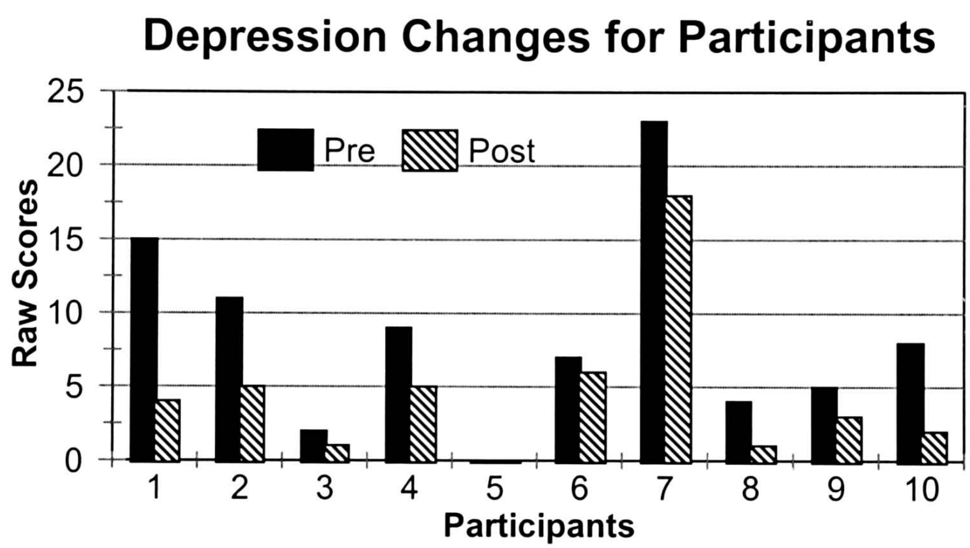


Figure 3. Changes in anger for participants 1-10. An increase in score represents decrement for anger. A decrease in score represents improvement for anger.

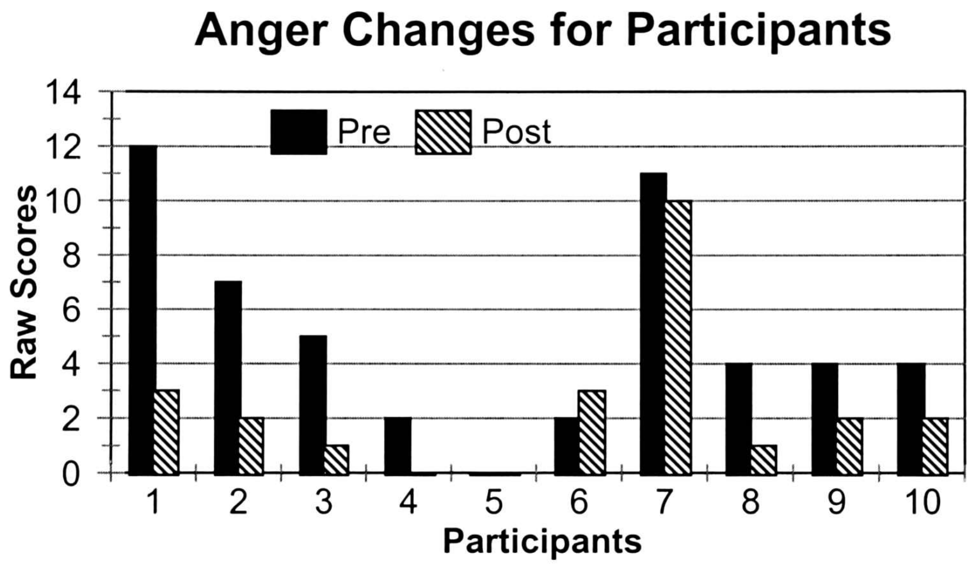


Figure 4. Changes in fatigue for participants 1-10. An increase in score represents decrement for anger. A decrease in score represents improvement for anger.

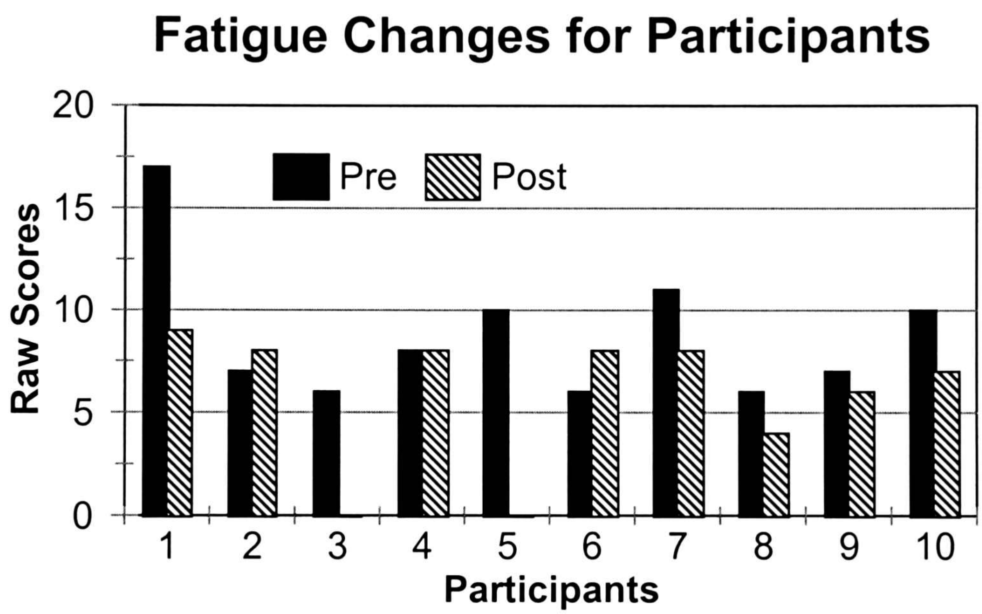


Figure 5. Changes in confusion for participants 1-10. An increase in score represents decrement for anger. A decrease in score represents improvement for anger.

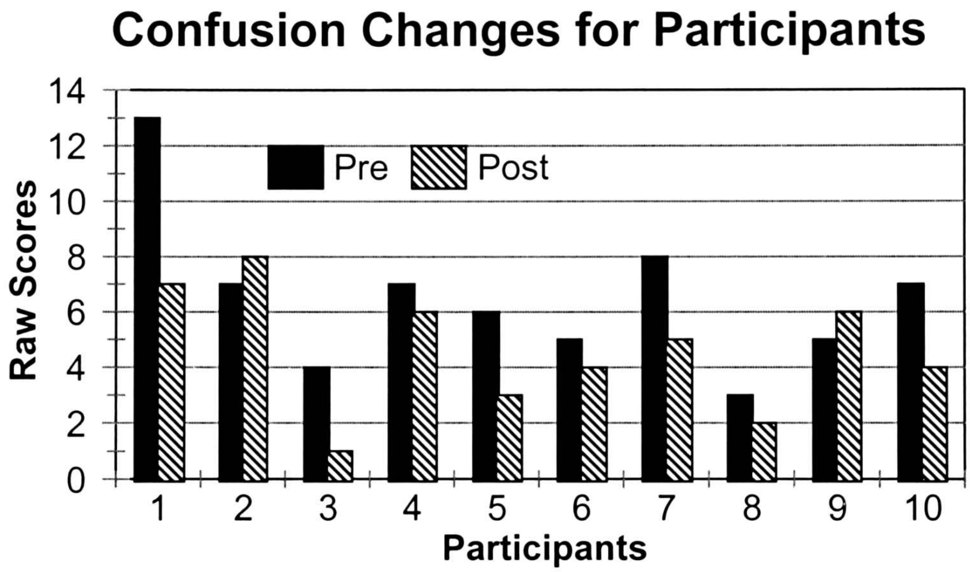


Figure 6. Changes in vigor for participants 1-10. A decrease in score represents decrement for vigor. An increase in score represents improvement for vigor.

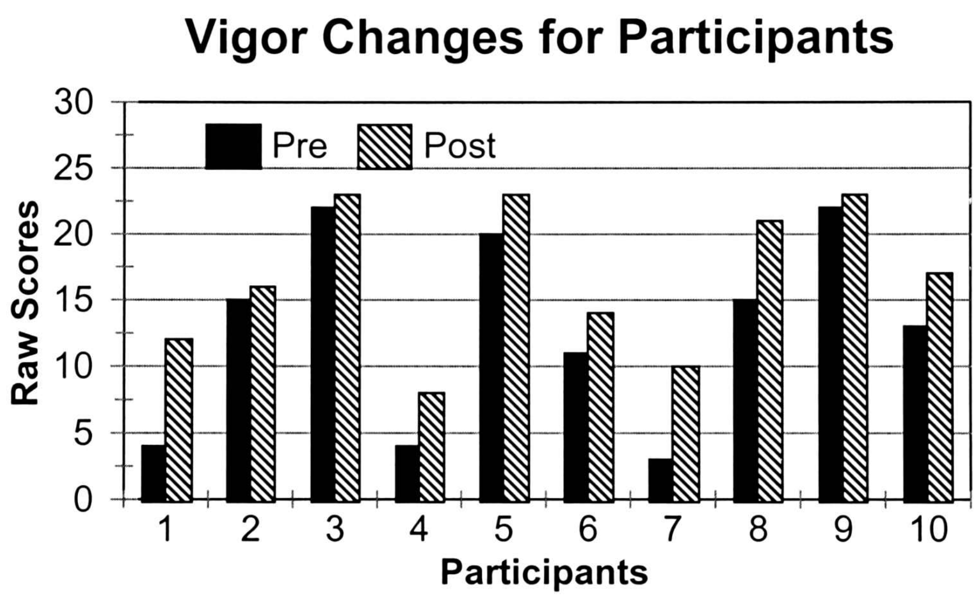


Figure 7. Changes in TMD (Total Mood Disturbance) for participants 1-10. An increase in score represents decrement for TMD. A decrease in score represents improvement for TMD.

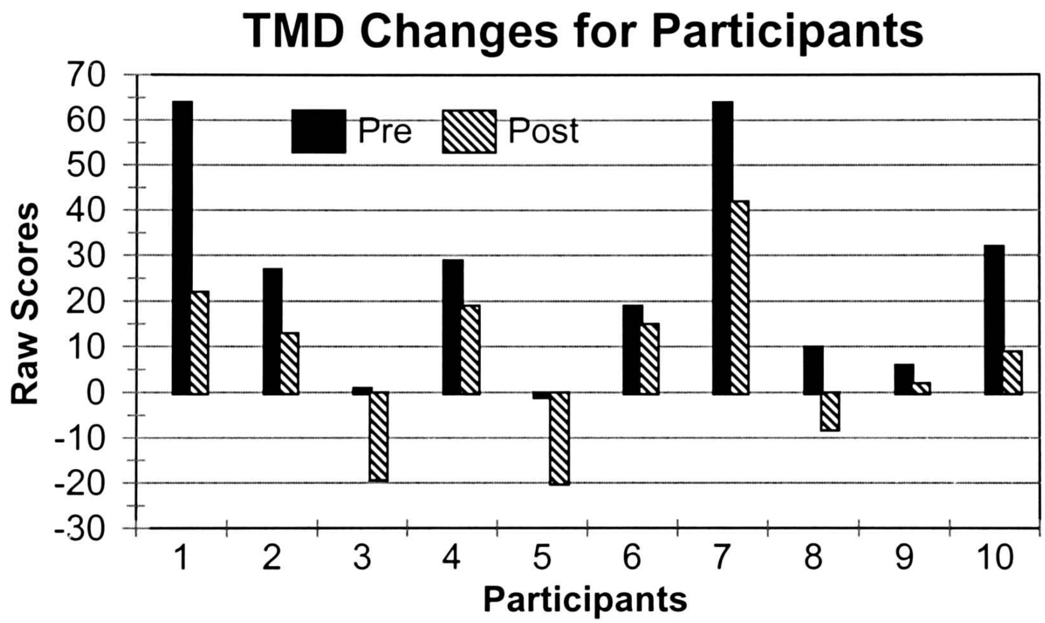
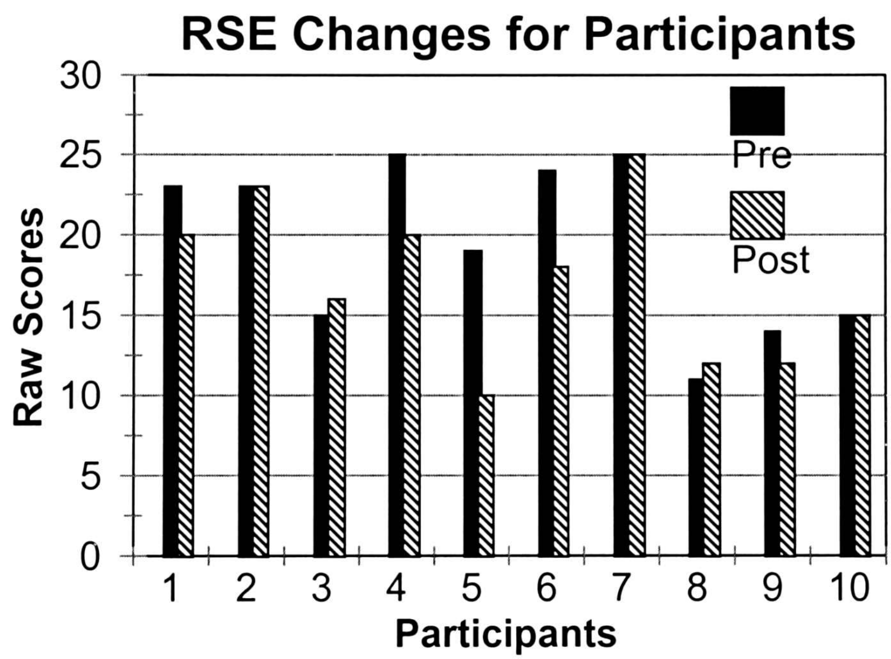


Figure 8. Changes in RSE (Rosenberg Self-esteem scores) for participants 1-10. An increase in score represents decrement for RSE. A decrease in score represents improvement for RSE.



Appendix A

Research Questions

1. What are the effects of aerobic training and combination training on self-esteem and mood state?

2. Do participants in an aerobic training program and participants in a resistance and aerobic training program report similar changes in mood state and self-esteem?

3. Do participants who are active outside of the rehabilitation program and participants who are inactive report similar changes in mood state and self-esteem?

4. Are there common variables in which the participants report improvements?

Definition of Terms

aerobic training - rhythmic movements of the larger muscle groups against relatively small resistance during efforts of minutes or longer (Stewart, 1992).

cardiac hypertrophy - a fundamental biologic adaptation of muscle to an increased work load (McArdle, Katch, & Katch, 1991).

mood - typical and persistent reactions to current life situations (Oldridge et al., 1995) will be determined by the POMS (1971).

rate-pressure product - a product of systolic blood pressure and heart rate (McArdle, Katch, & Katch, 1991).

resistance training - exercise performed against variable loads which produces tension within the muscle (Goldberg, 1989).

self-esteem - a perception of one's view of self (Kohr et al., 1988) will be determined by RSE (1965,1989).

Assumptions

It was assumed that the center supervisors administered all questionnaires and inventories properly and based upon the guidelines provided. It was also assumed that all participants used in this study were honest in their responses to the questionnaires and inventories. Also, it was assumed that all participants followed the exercise guidelines set up by the facility exercise physiologist for their respective programs.

Limitations

The cardiac rehabilitation centers used for this study were not randomly selected. They were chosen for convenience reasons and to help control inconsistencies between data collection by already being acquainted with the programs and the center supervisors. The researcher did not have control over the program prescribed for each participant. Another limitation was the variations among resistance and aerobic training programs at the different facilities. The established time period of eight weeks might not have been long enough to show improvement for all participants. This time period was important since most studies of this nature have continued for approximately 10-16 weeks. However, research has shown improvements in as little as 8 weeks. Also, the POMS is a state measure and this study was using it as a trait measure which has previously been done but could be considered a limitation. There was also no control over the cardiac medications or other mood altering drugs that the participants may have been taking during the study.

Delimitations

All quality of life parameters are important to cardiac rehabilitation but not all were targeted in this study. Self-esteem and mood state were chosen for this particular study. The two psychological variables chosen have been researched frequently in healthy populations, but more research is needed for a cardiac rehabilitation population. Also, participants making the transition from phase II to phase III were selected to try to establish a baseline for rehabilitation status that served as a control within the study.

Significance of the Study

This study will provide much needed information about psychological responses to exercise training in cardiac patients. Few studies have investigated mood state and self-esteem in cardiac rehabilitation patients and only three have specifically targeted these variables along with resistance training (Shephard et al., 1985; Oldridge et al., 1995; Beniamini et al., 1997). This research will add to the minimal amount of research that has been done in this area. This study will help determine whether a combination of aerobic and resistance training is beneficial for improving mood state and self-esteem in cardiac patients over a period of 8 weeks. Patients are engaging in the resistance training programs without knowing all of the potential benefits. This study will also help to establish a baseline for psychosocial responses to resistance training in cardiac rehabilitation that will lead to further research in this area.

Appendix B

Aerobic Training

Aerobic exercise is and has been the primary mode of training used in cardiac rehabilitation for over thirty years (Daub, Knapik, & Black, 1996). In 1962, supported by the Vocational Rehabilitation Administration of Health Education and Welfare in Washington D.C., patients who suffered from myocardial infarction or valvular heart disease were physically trained for 16 weeks. This was one of the first and largest projects utilizing physical training as treatment for these conditions. The project was successful and lead the way for further utilization of training programs for cardiac patients (Kellermann, 1993).

Aerobic fitness activities include rhythmic movements of large muscle groups against little resistance for minutes or longer (Kellermann, 1989; McKelvie & McCartney, 1990; Daub, Knapik, & Black, 1996). This traditional approach to cardiac rehabilitation includes activities such as walking, jogging, swimming, cycling, rowing, and stair-climbing (McKelvie & McCartney, 1990; Butler, Palmer, & Rogers, 1992). Aerobic exercises are alsoprescribed for the maintenance and improvement of cardiovascular fitness (Faigenbaum et al., 1990). These activities have produced many benefits for cardiac patients.

Aerobic activities have produced improvements in maximal exercise performance and overall endurance (McKelvie & McCartney, 1990). One of the major changes is an improvement in the ability of the skeletal muscles to use oxygen from circulating blood, which decreases the workload demand of the heart (Daub, Knapik, & Black, 1996). An improvement of cardiorespiratory fitness and the ability to tolerate repetitive work enables the patient to do more work with less cardiac effort (Stewart, 1992; Sword, 1992). This result is substantial for patients with Coronary Artery Disease (CAD) who have limited blood supply through the coronary arteries.

Regular aerobic physical activity improves cardiac efficiency by increasing stroke volume and reducing heart rate and blood pressure at rest and during submaximal exercise (Goldberg, 1989; Kelley, 1997). Additional cardiac benefits include increased cardiac volume, cardiac output, VO2 max, vasodilatory capacity, muscle capillarization, regional blood flow, oxygen delivery to tissues, and decreased myocardial oxygen demand, peripheral vascular resistance. (Goldberg, 1989; Butler, Palmer, & Rogers, 1992; Stewart, 1992). Exercise training benefits for individuals with hypertension, particularly those in the borderline ranges (Harris & Holly, 1987). Physical exercise also helps with risk factors such as hyperlipidemia, diabetes, obesity, and mortality (Stewart, 1992). A study by Sword (1992) found that aerobic exercise resulted in an average reduction in all-cause mortality and reinfarction mortality of 20 to 25% during a three year follow up period after treatment. Along with cardiac and physiological benefits, there has been research supporting psychological benefits due to aerobic exercise.

Physical exercise is widely believed to have psychological benefits that include an improved sense of well-being and possibly an increased resistance to emotional stressors that may negatively impact cardiovascular function (Ewart, 1989). Studies of non-cardiac populations have shown that exercise promotes improved mood, increases self-concept and reduces cardiovascular responses to behavioral stressors (Blumenthal, Emory, & Rejeski, 1988). Self-efficacy enhancement may help to explain improvements in mood and psychological well-being that often are a consequence of aerobic exercise (Ewart, 1989). Depressed patients have also reported benefits from aerobic exercise (Taylor, Houston-Miller, Ahn, Haskell, & Debusk, 1986). Some researchers have not supported the idea that participation in a training program improves psychological well-being (Dracup et al., 1991). Cardiac patients and their families are convinced that an aerobic training program improves their overall mood state, but objective evidence of this change remains scarce (Shephard, Kavanagh, & Klavora, 1985).

An emerging concept in cardiac rehabilitation has been the incorporation of resistance training activities in conjunction with the traditional aerobic training program. When comparing the cardiac responses of aerobic training to those found with a resistance training program, similar blood pressure and heart rate patterns have been reported (Stewart, 1992; Sword, 1992). However, many resistance training issues remain controversial due to the nature of the exercises and the ability of the cardiac patient to perform them.

Resistance Training

Resistance training may be beneficial for healthy individuals. McKelvie and McCartney (1990) and Stewart (1989) reported improvements in muscular strength and endurance, power, and muscle mass for healthy individuals. Improvements in self-efficacy have also been demonstrated with resistive exercise programs (Squires et al., 1991). The benefits of resistance training have been consistently reported for over 20 years, however, resistance training has only recently become a part of cardiac rehabilitation programs. The unwillingness to incorporate resistance training was largely associated with concerns of safety.

Cardiac responses to resistance training were seen as more detrimental than beneficial to the rehabilitation process. Resistance training can produce large increases in heart rate (HR) (Butler, Beierwaltes, & Rogers, 1987; Verrill et al., 1992) and blood pressure (BP) (Butler, Beierwaltes, & Rogers, 1987; Harris & Holly, 1987; Kelemen, 1989; Stewart, 1989; Cononie et al., 1991; Verrill et al., 1992) in healthy participants. It has also been reported that the increase in blood pressure can produce a substantial increase in the rate-pressure product and left ventricular end-diastolic pressure (LVEDP) resulting in myocardial ischemia, arrhythmias, and ventricular decompensation (Butler et al., 1987; Ghilarducci, Holly, & Amsterdam, 1989; Stewart, 1989; Stewart, 1992; Verrill et al., 1992; Featherstone, Holly, & Amsterdam, 1993; Daub et al., 1996).

There are findings that suggest that resistance training is safe for cardiac patients. According to Maiorana et al. (1997) and Stewart et al. (1998), resistance training does not substantially increase the rate-pressure product, initiate ischemia or arrhythmias, or cause ventricular dysfunction in low risk patients. Resistance training is now considered as a suitable activity for selected patients with cardiac disease (Daub et al., 1996). Stewart (1989,1992), Daub et al. (1996), and Faigenbaum and Beniamini (1997) state that low-to-moderate intensity training performed early after a myocardial infarction is beneficial and may demonstrate lower rates of cardiovascular complications than aerobic exercise. Stewart (1989) and Wiley et al. (1992) also report that resistance training is safe and can improve coronary risk factors such as lipid profile and blood pressure.

With the implementation of a resistance training program, several cardiac responses have demonstrated improvement. Goldberg (1989) and Maiorana et al. (1997) state that resistance training in healthy individuals may reduce heart rate, systolic blood pressure, and rate-pressure product. A meta-analytic review by Kelley (1997) concluded that dynamic resistance exercise reduces resting systolic and diastolic blood pressure in healthy adults.

One study targeting isometric exercise training and blood pressure concluded that isometric exercise can in fact reduce resting blood pressure which in the long run can reduce the risk of mortality (Wiley et al., 1992). Haennel, Quinney, and Kappagoda (1991) also reported reductions in resting heart rate with hydraulic circuit training in post-coronary artery bypass patients. Much of the reductions in resting blood pressure and heart rate has been attributed to changes in sympathetic neural influences on total peripheral resistance (TPR) (Wiley et al., 1992). However, changes in stroke volume and cardiac output may also be associated with the reductions in blood pressure and heart rate (Goldberg, 1989; Haennel et al., 1991; Wiley et al., 1992). The reductions in stroke volume may be attributed to changes in central sympathetic outflow by reducing venous return and preload (Wiley et al., 1992). However, these possible changes warrant further investigation. The documented blood pressure responses have been compared to similar responses observed in endurance and aerobic activities (Harris & Holly, 1987; Stewart, 1992; Sword, 1992). All of these positive cardiac responses support the idea that resistance training is important for cardiac rehabilitation patients.

There are other changes unassociated with cardiac improvements that help to support the idea that resistance training is important and beneficial for a cardiac rehabilitation population. One of the major goals of cardiac rehabilitation is to allow patients to resume their everyday lifestyles to the fullest extent possible (Kelemen, 1989; Squires et al., 1991; Daub et al., 1996). Incorporating a safe program of strength-development into a traditional cardiac rehabilitation program should facilitate patients' return to normal, productive lives (Butler et al., 1987). Untrained patients may encounter everyday difficulties carrying large weights during everyday life which can be avoided by participating in a resistance training program (Cokkinos, 1996).

Returning cardiac patients to work immediately after rehabilitation has often been delayed due to fear of complications resulting in patient anxiety and economic burden (Stewart, 1992). According to Stewart (1992), these fears most commonly occur in patients whose jobs require moderate-to-heavy lifting. Many job-related tasks require upper and/or lower extremity static and/or dynamic muscular strength (DeBusk et al., 1978; Franklin et al., 1991; Squires et al., 1991). Because most aerobic training activities focus primarily on the lower body, there is a need to focus more on the upper body (Haennel, Quinney, Kappagoda, 1991; Butler, Palmer, and Rogers, 1992). Improvement in strength, especially upper body strength, is important for many patients to facilitate and enhance return to work and resume occupational requirements (Kelemen et al., 1986; Stewart, 1989; Butler et al., 1992; Stewart, 1992; Haskell, 1994; Merrill, 1997). The improvements in both upper and lower body strength due to resistance training permit cardiac patients to perform daily lifting, carrying, and moving activities at a lower circulatory response, lower percent of maximal strength, and with greater efficiency of movement (Verrill, 1996; Faigenbaum & Beniamini, 1997).

In addition to improving return to work status and work production, other activities can also be enhanced through resistance training. Returning to recreational and leisure-time activities is also important for cardiac patients (Kelemen et al., 1986; Stewart, 1989; Maiorana et al., 1997). Resistance training has aided in returning patients to their premorbid level of social activity (Daub et al., 1996; Merrill, 1997).

Many activities of daily living require moderate levels of muscular strength (Haslam et al., 1988; Verrill et al., 1992; Daub et al., 1996; Verrill & Ribisl, 1996). Evidence has shown that a loss of strength may have a substantial effect on patients' ability to lead independent lives (Frontera et al., 1988). In fact, many activities of daily living, as well as vocational and recreational activities, place demands on the cardiovascular system which more closely parallel heavy resistance exercise than aerobic exercise (Faigenbaum et al., 1990). Through resistance training programs, patients' daily living activities have been improved and enhanced to closely resemble their pre-event daily living status (Verrill et al., 1992; Verrill, 1996; Verrill & Ribisl, 1996).

Along with the physiological benefits mentioned previously, there has also been evidence of many psychological benefits associated with resistance training including quality of life. Quality of life "encompasses the total well-being of the person, including physical and psychosocial aspects" (Bubien et al., 1996, p. 1585). Bubien et al. (1996) also state that more importantly, quality of life is relative to the individual's appraisal of his or her life. A patient's quality of life may fluctuate at times due to disease activity variations (Hlatky & Vaugn, 1996). Singh, Clements, and Fiatarone (1997) looked at progressive resistance training in depressed elders. They found significant quality of life improvements in vitality, bodily pain, emotions, and social functioning as a result of progressive resistance training.

Level of well-being has been shown to predict health care expenditures and death no matter what chronic condition a person has (Stewart et al., 1989). Well-being has shown favorable effects from resistance training in numerous studies (Ewart, 1989; Franklin et al., 1991; Lavie & Milani, 1996; Verrill & Ribisl, 1996; Faigenbaum & Beniamini, 1997).

Self-efficacy is another psychological variable that has been improved following resistive exercise. Self-efficacy is defined as "one's level of certainty that one can perform a given task or behavior" (Ewart, 1989, p.683). Ewart (1989) describes how to increase patient self-efficacy through four ideas originally proposed by Bandura (1977; 1982). First, expose them to the recommended activity in gradually increasing doses (performance). Second, arrange for them to see other patients similar to themselves performing the activity (social modeling). Third, have respected health care providers offer encouragement and reassurance for the patients' accomplishments (persuasion). And finally, provide an appropriate location for the activity so as to induce a relaxed but "upbeat" mood (arousal). Ewart et al. (1986) suggests that self-efficacy judgments mediate behavior and the more activities you enjoy, the more active you will probably be. Stewart (1988) found that programs offering a wide variety of exercises, including strength activities, will have a greater influence on psychologic and motivational components than programs emphasizing single activities. In summary, resistance training has been shown to substantially increase self-efficacy and self-image in cardiac patients (Ewart et al., 1986; Stewart et al., 1988; Ewart, 1989; Stewart, 1989; Squires et al., 1991; Verrill et al., 1992).

Negative emotions can interfere with patients' capacities to cope with physical illness which can result in poor quality of life (Lesperance & Frasure-Smith, 1996). Coping may be improved by persuasive counseling by physicians or family members, which may allow patients to deal with their illnesses and begin returning to normal activities (Neil et al., 1985). Negative emotions have been attributed to increasing the risk of mortality in coronary heart disease patients and are also the core symptoms of mood and anxiety disorders (Lesperance & Frasure-Smith, 1996). Emotional distress and perceived disability have been linked to failure to return to work (Denollet & Brutsaert, 1995). Enhancing self-efficacy, which can be done through strength exercises, has been shown to improve the coping process (Ewart, 1989).

Depression is common in patients with coronary heart disease and in patients who have had a myocardial infarction (Frasure-Smith et al., 1993; Milani et al., 1996; Jette & Downing, 1996). Depression may occur when patients feel they can no longer perform their job adequately (Cay & Walker, 1988). Patients having major depression following an MI were at significantly greater risk of dying within six months after the MI (Frasure-Smith et al., 1993). Depression has been shown to decrease with exercise training in cardiac rehabilitation (Taylor et al., 1986; Dracup et al., 1991; Haskell, 1994). Specifically, progressive resistance training was shown to significantly improve depression scores two to three times greater than a control group (Singh et al., 1997).

Patients with cardiac conditions commonly experience substantial levels of anxiety (Blumenthal et al., 1988; Lesperance & Frasure-Smith, 1996). Engebretson et al.

(1999) reported that individuals with high levels of anxiety are at increased risk for cardiac death. Anxiety has been shown to decrease with exercise training in cardiac rehabilitation (Taylor et al., 1986; Dracup et al., 1991; Haskell, 1994; Milani et al., 1996). A study by Oldridge et al. (1991) focusing on quality of life after MI, found that after only 8 weeks of exercise training there was a significant decrease in anxiety and an increase in exercise tolerance.

Anger and hostility are common in patients with coronary heart disease (Lesperance & Frasure-Smith, 1996). A study by Jette and Downing (1996) involved psychological impairments to health status in cardiac rehabilitation. Results showed that twenty-five percent of their sample population exhibited evidence of hostility in addition to their cardiovascular disease. Anger and hostility have been shown to decrease with exercise (Blumenthal et al., 1988; Milani et al., 1996).

Personality type has also been a focus of cardiac research. Lesperance and Smith (1996) reported that Type-A personality has been shown to enhance coronary risk factors. They also reported a new personality type, Type-D, as the distressed personality which may increase the risk of mortality in coronary heart disease patients.

Mood state has also been an area of interest for cardiac rehabilitation. Improved mood state may influence modifications in self-efficacy which may encourage the individual to aspire more challenging exercise goals (Ewart et al., 1986; Ewart, 1989). Mood variation may be affected by a variety of factors including type of exertion, exercise environment, cognitive and physical characteristics, and time at which mood is measured (Ewart, 1989). Ewart (1989) states that measurements taken during or immediately after a rigorous exercise session may reveal no effect on mood or an undesired effect associated with increased fatigue, dizziness, or discomfort.

Improvement in patient perception of mood is an important outcome of cardiac rehabilitation (Denollet & Brutsaert, 1995; Oldridge et al., 1991). One study investigating the relationship of moods and exercise have reported that increase activity is associated with reductions in depression, anxiety, and pessimism (Ewart, 1989). Beniamini et al. (1997) focused on the effects of high intensity strength training on self-efficacy, mood states, and well-being. Subjects included 38 patients training twice a week for 12 weeks. The Profile of Mood States (POMS; 1971) was used to assess mood changes over the 12 week period. The results showed no cardiac complications from the strength training program and Beniamini et al. (1997) reported significant beneficial effects on depression, fatigue, tension, anger, and vigor (all except confusion). Shephard et al. (1985) focused on mood state in post MI cardiac rehabilitation patients. They reported improvements in five of the six POMS variables including anger, depression, tension, confusion and vigor (all except fatigue). The fatigue score remained the same throughout the study. Engebretson et al. (1999) studied mood changes in 53 cardiac patients after 12 weeks of participation in a phase II program. They reported significant decreases in tension, depression, confusion, and TMD and a significant increase in vigor. They reported a trend for fatigue to decrease and no change in anger reports.

Self-esteem is considered the evaluative component of self-concept and refers to an individual's positive feelings about himself or herself (Caruso & Gill, 1992). According to Raymore et al. (1994), individuals with low self-esteem may appear passive, shy, unfavorable, and vulnerable, and individuals with high self-esteem may appear happy, independent, and socially active. It is important to consider variation in activities to improve self-esteem (Caruso & Gill, 1992). Caruso and Gill (1992) focused on the effects of weight training programs on self-esteem in a 10 week study using college-aged females. They assessed changes in self-esteem with the Rosenberg Self-esteem Scale (RSE) (Rosenberg, 1965; 1989). Caruso and Gill concluded that physical self-perceptions and fitness are enhanced by exercise participation. They also reported that changes in self-esteem may be found in individuals starting exercise with low self-esteem, troubled adolescents, or obese individuals. Inconclusive results in self-esteem studies have been due to methodological deficiencies (Caruso & Gill, 1992).

In conclusion, there have been numerous studies focusing on the issues of safety and benefits of resistance exercise in cardiac rehabilitation. Patients who are screened properly and eligible for this type of training should not receive any detrimental effects based on the research findings. Patients should improve physical strength along with benefits to the cardiovascular system as well. Psychological research also suggests that implementation of a resistance training program into cardiac rehabilitation may improve numerous psychological variables including self-esteem and mood state.

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Appendix C

INSTITUTIONAL REVIEW BOARD RESEARCH PROPOSAL FORM FOR RESEARCH INVOLVING HUMAN SUBJECTS

The purpose of tins information is to provide the IRB with sufficient data to understand the use of and safeguards for human subjects in your research proposal. The Board is not concerned with evaluating the quality or focus of your research, but only the use of human subjects. Please reproduce this form (exactly) on your wordprocessor. Please be as concise and brief as possible in providing the requested information.

1. Statement of the problem to be studied.
The purpose of this study is to determine the effects of a resistance training program on mood state and self-esteem in cardiac rehabilitation patients using the Profile of Mood States Questionnaire and the Rosenberg Self-Esteem Scale. The goal of this project is to compare those patients who are involved in a non-resistance training program to those who are participating in a resistance training program. This research aims to determine the impact that resistance training has upon the chosen quality of life parameters.

II. Describe your research design.
The study will involve a single question inventory based on activity level and the 2 questionnaires mentioned above being administered as a pre-test/ post-test survey. The questionnaires will be completed twice over an 8 week period. The rehabilitation centers' supervisor will administer the questionnaires each time. Test-retest reliability scores are reported at r--.85 for the Rosenberg and range from r--.65 to r--.74 for the POMS. The questionnaires are short and will be completed before the patients' usual workout begins, so as not to interfere with their daily exercise routine.

III. Description of possible risk to human subjects. If procedures involve the use of any biohazardous materials or substances (including, but not limited to, hazardous chemicals, restricted drugs, needles or other contaminable materials, and/or infectious agents) the researcher must complete the IBC Biosafety Protocol (See the DIRB Chair for appropriate forms).
This study involves no use of bio,hazardous materials or substances. There is no risk of injury while completing the brief questionnaires.

IV. Description of possible benefits to human subjects and society in general.
The subjects in this study will benefit from their individualized rehabilitation programs involving both aerobic training and/or resistance training as planned apart from this study. They will also have the opportunity to provide some much needed information about the specific effects that resistance training has on mood state and self-esteem. The long term implications can be very important to cardiac rehabilitation programs for future exercise prescription.

V. Information on participants to be utilized in the research. Describe the sample and sampling technique. If flyers or advertisements are used include a copy. If using in-class methods, please provide a rationale for why the data has to be collected during class time as well as the educational benefits that the students will realize by participation.

Several cardiac rehabilitation centers in Georgia and South Carolina have been selected as data collection sites for this study. All patients will currently be enrolled in the cardiac rehabilitation program. All patients will have completed phase II at their respective sites and will be making the transition to phase III or will have just begun phase III. All results will be reported in an anonymous fashion. All patients will be assigned an identification number which only the center supervisor will know. This will be done for several reasons. First, because data will be entered as pre/post, the data will need to correspond to the appropriate subject. Also, subjects will be allowed to receive feedback from the research if it is wanted after the study has been concluded. Demographic data will include age, gender, race, weight, height, medical reason for rehabilitation, time spent in rehab., other medical conditions, previous exercise experience, leisure activities assessment, and a brief job description. Individual results will only be available for the patients from each individual cardiac center.

VI. Materials and procedures to be used. Please attach a copy of any questionnaires, interview questions, flyers, and/or newsprint or other materials that may be used.
See attached documents.

VII. Procedures to secure informed consent. Please attach a copy of the Informed Consent Form. When deception is necessary, attach a copy of the debriefing plan.
Informed consent document attached.

VIII. Procedures to gain consent and utilize minors in the research.
No minors will be utilized in this research.

IX. Please provide an explanation, if any of the data collected will relate to illegal activities.
No data will relate to illegal activities.

Appendix D

GEORGIA SOUTHERN UNIVERSITY
Department of Health & Kinesiology
College of Health & Professional Studies

CONSENT TO PARTICIPATE IN A RESEARCH PROJECT FORM

I understand that the Questionnaire I am about to complete is part of a research project entitled "Cardiac Rehabilitation and Quality of Life", conducted by Cyndee M. Lee (Graduate Student under the supervision of Dr. Kent Guion) 912-681-7932. This survey is designed to study quality of life parameters in cardiac rehabilitation patients who are actively participating in an exercise program. by signing below, I am agreeing to allow Cyndee M. Lee To use the information I provide in presentation and publication.

I understand that any relationship between myself and the information I contribute to this study will be kept confidential. I understand that I may terminate participation in this study at any time without prejudice to myself, employment status or any other personal matter. Given the nature of this study I further acknowledge that the investigator may in his/her discretion terminate the study at any time deemed appropriate.

If I have any questions or concerns about my rights as a research participant, I may contact Dr. Kevin L. Burke, Chair of the Departmental IRB, (912-681-5267), or the IRB Coordinator at the Office or Research Services and Sponsored Programs (912-681-5465).

Print Subject's Name ____________________

Subject's Signature ____________________

Date ________________

Appendix E

The Rosenberg Self-Esteem Scale

Please read each item and then circle the number which best characterizes you.

1. I feel that I am a person of worth, at least on an equal plane with others.
1-Strongly agree
2-Agree
3-Disagree
4-Strongly disagree

2. I feel that I have a number of good qualities.
1-Strongly agree
2-Agree
3-Disagree
4-Strongly disagree

3. All in all, I am incline to feel that I am a failure.
1-Strongly agree
2-Agree
3-Disagree
4-Strongly disagree

4. I am able to do things as well as most other people.
1-Strongly agree
2-Agree
3-Disagree
4-Strongly disagree

5. I feel that I do not have much to be proud of.
1-Strongly agree
2-Agree
3-Disagree
4-Strongly disagree

6. I take a positive attitude about myself.
1-Strongly agree
2-Agree
3-Disagree
4-Strongly disagree

7. On the whole I am satisfied with myself.
1-Strongly agree
2-Agree
3-Disagree
4-Strongly disagree

8. I wish I could have more respect for myself.
1-Strongly agree
2-Agree
3-Disagree
4-Strongly disagree

9. I certainly feel useless at times.
1-Strongly agree
2-Agree
3-Disagree
4-Strongly disagree

10. At times, I think I am no good at all.
1-Strongly agree
2-Agree
3-Disagree
4-Strongly disagree

Appendix F

Below is a list of words that describe feelings people have. Please read each one carefully. Then fill in ONE space under the answer to the right which best describes HOW YOU HAVE BEEN FEELING DURING THE PAST WEEK INCLUDING TODAY.

IDENTIFICATION

The numbers refer to these phrases.

0 = Not at all
1 = A little
2 = Moderately
3 = Quite a bit
4 = Extremely

Item	0 NOT AT ALL	1 A LITTLE	2 MODERATELY	3 QUITE A BIT	4 EXTREMELY
1. Friendly	0	1	2	3	4
2. Tense	0	1	2	3	4
3. Angry	0	1	2	3	4
4. Worn out	0	1	2	3	4
5. Unhappy	0	1	2	3	4
6. Clear-headed	0	1	2	3	4
7. Lively	0	1	2	3	4
8. Confused	0	1	2	3	4
9. Sorry for things done	0	1	2	3	4
10. Shaky	0	1	2	3	4
11. Listless	0	1	2	3	4
12. Peeved	0	1	2	3	4
13. Considerate	0	1	2	3	4
14. Sad	0	1	2	3	4
15. Active	0	1	2	3	4
16. On edge	0	1	2	3	4
17. Grouchy	0	1	2	3	4
18. Blue	0	1	2	3	4
19. Energetic	0	1	2	3	4
20. Panicky	0	1	2	3	4
21. Hopeless	0	1	2	3	4
22. Relaxed	0	1	2	3	4
23. Unworthy	0	1	2	3	4
24. Spiteful	0	1	2	3	4
25. Sympathetic	0	1	2	3	4
26. Uneasy	0	1	2	3	4
27. Restless	0	1	2	3	4
28. Unable to concentrate	0	1	2	3	4
29. Fatigued	0	1	2	3	4
30. Helpful	0	1	2	3	4
31. Annoyed	0	1	2	3	4
32. Discouraged	0	1	2	3	4
33. Resentful	0	1	2	3	4
34. Nervous	0	1	2	3	4
35. Lonely	0	1	2	3	4
36. Miserable	0	1	2	3	4
37. Muddled	0	1	2	3	4
38. Cheerful	0	1	2	3	4
39. Bitter	0	1	2	3	4
40. Exhausted	0	1	2	3	4
41. Anxious	0	1	2	3	4
42. Ready to fight	0	1	2	3	4
43. Good natured	0	1	2	3	4
44. Gloomy	0	1	2	3	4
45. Desperate	0	1	2	3	4
46. Sluggish	0	1	2	3	4
47. Rebellious	0	1	2	3	4
48. Helpless	0	1	2	3	4
49. Weary	0	1	2	3	4
50. Bewildered	0	1	2	3	4
51. Alert	0	1	2	3	4
52. Deceived	0	1	2	3	4
53. Furious	0	1	2	3	4
54. Efficient	0	1	2	3	4
55. Trusting	0	1	2	3	4
56. Full of pep	0	1	2	3	4
57. Bad-tempered	0	1	2	3	4
58. Worthless	0	1	2	3	4
59. Forgetful	0	1	2	3	4
60. Carefree	0	1	2	3	4
61. Terrified	0	1	2	3	4
62. Guilty	0	1	2	3	4
63. Vigorous	0	1	2	3	4
64. Uncertain about things	0	1	2	3	4
65. Bushed	0	1	2	3	4

T D A V F C

MAKE SURE YOU HAVE ANSWERED EVERY ITEM.

POM 021

CC 9216-A

OPTICAL SCANNING CORPORATION

Appendix G

Individual Information

I.D.# [ ]

Age__________ Gender (M/F)__________ Race______________

Weight__________ Height__________

Medical Reason for Rehabilitation

____

____

How long have you been involved in cardiac rehab?______________________

List other medical conditions not mentioned above.

____

____

____

Previous exercise experience (please be specific).

____

____

____

Occupation or former occupation if retired and how long?

____

____

Assessment of Leisure Time Exercise Behavior
by
Godin Self Report

Please circle your answer to the following question:

How often did you participate in active sports or vigorous physical activities long enough to get sweaty during leisure time within the past four months?

1) not at all
2) less than once a month
3) about once a month
4) about 2 or 3 times a month
5) about 1 or 2 times a week
6) 3 or more times a week