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The Effects of Aerobic Exercise on State and Trait Body Image and Physical Fitness Among College Women

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THE EFFECTS OF AEROBIC EXERCISE ON STATE AND TRAIT BODY IMAGE AND PHYSICAL FITNESS AMONG COLLEGE WOMEN

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ABSTRACT

THE EFFECTS OF AEROBIC EXERCISE ON STATE AND TRAIT BODY IMAGE AND PHYSICAL FITNESS AMONG COLLEGE WOMEN

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Cumulative evidence shows body dissatisfaction is a salient problem among women, and is linked to various psychological disorders and disturbances. While numerous perspectives regarding the negative body-image phenomenon exist, one area of scientific inquiry is the relationship between physical exercise and body image. With the current sociocultural emphasis on physical fitness and attractiveness, the effects of exercise on body image warrants serious consideration. The present investigation compared 57 women who participated in a 13-week aerobic exercise program to 29 sedentary control women on the following variables: state and trait body image, cardiorespiratory fitness, and body composition. The exercising women were randomly assigned to complete the state body-image assessment either immediately following exercise (n = 31) or the following sedentary day (n = 26). This was done to evaluate the reactivity of the immediate exercise experience or environment on body image. The study's results confirmed that, relative to the sedentary women, the exercisers made significant improvements on trait body image, related both to their

appearance and their fitness and health. In addition, participants in exercise training significantly improved state body-image satisfaction over time, regardless of whether assessment was immediate or delayed. These results indicate that aerobic exercise is effective in the stable improvement of state and trait body image. Furthermore, the exercisers exhibited significant gains in cardiorespiratory fitness, while the sedentary women did not. Although body fat was substantially lowered over time among the exercisers, these reductions were not significant compared to the controls. The exercisers' favorable outcomes were sustained at 9-10 week follow-up among those who continued to exercise ($\underline{n}$ = 20). The present investigation offers optimism for improving body satisfaction for women who are willing to participate in aerobic exercise. The extent to which exercise positively alters body image among other populations warrants further research.

DEDICATION

TO DAVID

FOR STANDING BY ME

"FAITHFULLY"

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CHAPTER 1

Introduction

Statement of Purpose

In today's society there exists a sociocultural emphasis on physical attractiveness and fitness. Dissatisfaction with physical appearance and body-image disturbances among the normal population are on the rise (Cash & Henry, in press; Cash, Winstead, & Janda, 1986). According to researchers, the societal pressures and extreme ideals for body composition fosters body image dissatisfaction so common, particularly among women, that authors term it "normative discontent" (Rodin, Silberstein, & Streigel-Moore, 1985). This prevalence of body-image dissatisfaction is of serious concern, as the implications are linked with various psychological disorders and disturbances such as, low self-esteem, depression, social anxiety, sexual dysfunction, anorexia nervosa, bulimia nervosa, and body dysmorphic disorder (Berscheid, Walster, & Bohrnstedt, 1973; Brown, Cash, & Lewis, 1989; Cash, 1990b; Cash & Hicks, 1990; Davis, 1990b; Freedman, 1990; Pruzinsky, 1990a; Rosen, 1990).

<u>Significance of the Study</u>

Numerous theories and perspectives regarding the negative body-image phenomenon exist (Cash & Pruzinsky, 1990; Krueger, 1990; Pruzinsky, 1990b; Wolf, 1991). One area of scientific inquiry involves the relationship between physical exercise and body image. While varied reasons exist regarding individuals' motives for exercise, researchers report that women primarily exercise to lose weight and enhance bodily appearance (Garner, Rockert, Olmsted, Johnson, & Coscina, 1985; Novy & Cash, 1995). Ultimately exercise is intended to enhance physiological health and improve how people think and feel about their body. While numerous researchers report the benefits of physical exercise on physiological and psychological health (Dannenberg, Keller, Wilson, & Castelli, 1989; Duncan, Gordon, & Scott, 1991; Fisher & Thompson, 1992; Stein & Motta, 1992), others question the role of physical exercise in perpetuating a heightened degree of body narcissism, an obsessive attitude toward weight and dieting, and an exaggerated discrepancy between self perceived body image and an internalized ideal (Davis, 1990a; Davis, 1990b; Katz, 1986; Kron, Katz, Gorzynski, & Weiner, 1978).

To date, the effects of physical exercise on body image remain uncertain. The implications of research investigating this relationship are readily apparent, particularly among individuals that reside in urban environments. These individuals are faced with unique factors effecting their quality of life (i.e., closed physical environments, higher crime rates, lower socioeconomic status; Eitzen & Sage, 1989) which can contribute to higher stress levels and other maladaptive psychological and physical conditions (Leonard, 1993). Physical exercise has the potential to enhance psychological and physical wellness. As such, it warrants most serious consideration.

Research Questions

The purpose of this research is to evaluate the effects of physical exercise on body image among female urban university students. The research and subsequent analysis will focus on:

(1) determining the effects of physical exercise on the consistent personality characteristic or "trait" body image, as measured by the Multidimensional Body-Self Relations Questionnaire (MBSRQ; Cash, 1990a);

(2) determining the effects of physical exercise on "state " body image immediately after exercise compared with hours after exercise, as measured by an adapted administration of the Body Areas Satisfaction Scale, a subscale of the MBSRQ;

(3) determining the effects of aerobic conditioning on cardiorespiratory fitness, as measured by the Queens College step test (McArdle, Katch, Pechar, Jacobson, & Ruck, 1972);

(4) determining the effects of aerobic conditioning on body composition, as measured by bioelectrical impedance analysis;

(5) determining the relationship between exercise motivation, measured by the Reasons for Exercise Inventory (Silberstein, Striegel-Moore, Timko, & Rodin, 1988; Silberstein, Mishkind, Striegel-Moore, Timko, & Rodin, 1989) and body image, measured by the adapted Body Areas Satisfaction Scale, and the Multidimensional Body-Self Relations Questionnaire.

The purpose of this research is to add to the existing literature by analyzing the effects of physical exercise on state and trait body image. It is important to recognize that physical exercise may influence psychological states and traits in a different fashion.

Hypotheses

Five primary hypotheses for this study are presented below.

Hypothesis 1

Subjects participating in the exercise treatment conditions (exercise training with immediate assessment, ET-I, and exercise training with delayed assessment, ET-D) will demonstrate significant positive changes on trait body image measures from pre- to posttest on the following subscales of the Multidimensional Body-Self Relations Questionnaire: Appearance Evaluation, Fitness/Health Evaluation, Overweight Preoccupation, and the Body Areas Satisfaction Scale. Significant changes from pre- to posttest are not predicted for the exercise treatment conditions on the Fitness/Health Orientation subscale. Significant changes are not predicted for the sedentary control group on any subscales of the MBSRQ.

Hypothesis Set 2

Subjects participating in both of the exercise treatment conditions (ET-I and ET-D) will demonstrate an overall significant positive change on each successive state body-image measure of the Body Areas Satisfaction Scale. Significant changes are not predicted for the state BASS over time for the control group (Hypothesis 2A).

Subjects participating in the exercise training-immediate condition will demonstrate significantly higher scores on each successive state body image measure on the BASS than will the exercise training-delayed condition (Hypothesis 2B).

Hypothesis 3

Subjects participating in the exercise treatment conditions (ET-I and ET-D) will demonstrate a significant positive change from pre- to posttest on cardiorespiratory fitness measures, assessed by the Queens

College step test. Significant changes from pre- to posttest on cardiorespiratory fitness measures are not predicted for the sedentary control group.

Hypothesis 4

Subjects participating in the exercise treatment conditions (ET-I and ET-D) will demonstrate a significant decrease in body fat from pre-to posttest measured by bioelectrical impedance analysis. Significant changes in body fat from pre- to posttest are not predicted for the sedentary control group.

Hypothesis 5

Among the exercising treatment conditions (ET-I and ET-D), a significant negative relationship will be demonstrated between appearance/weight management motives for exercise, and changes in state and trait body-image satisfaction. The opposite association is expected for fitness/health management motives and body-image change.

Overview

This study will evaluate the effects of physical exercise on body composition, cardiovascular fitness, state and trait body image among women at an urban university. Subjects motivations for exercise as they relate to body image will also be analyzed.

Chapter 2 is a review of pertinent literature regarding body-image theories, the psychological and physiological benefits of exercise, and the relationships between body image and exercise. Chapter 3 is a description of the population studied, specific methods and procedures utilized, the design of the study, and data collection instruments. Chapter 4 presents the results from statistical analyses of the data, and Chapter 5 contains a discussion of the findings.

CHAPTER 2

Literature Review

Body-Image Theories: Past and Present

Original body-image theories. The historical evolution of the body-image construct occurred at the turn of the century. The earliest body image studies evolved in the neurological lab focusing on populations with neurological disease and organ deficits. Bonnier has been credited with introducing body image as a construct for study in 1905 (Fisher, 1990). In 1926 Henry Head was the first to integrate a explanatory theory regarding body perceptions. He originated the term "body schema" to describe the unconscious criteria against which individuals judge body postures and movements.

Paul Schilder (1935), also a body-image pioneer, was responsible for the development of a broader view of body image that surpassed the pathological realm and includes both a physiological and psychological framework. In Schilder's view, body image is "the picture of our own body which we form in our own mind, that is to say, the way in which our body appears to ourselves (p.11)." Today, this definition of body image is probably most frequently cited.

Contemporary multidimensional theories. Throughout the past century numerous theories have been developed for the study of body image (Kolb, 1975; Schilder, 1935; Shontz, 1990). However many have been criticized for their unidimensional view of the construct (Fisher, 1990). More contemporary theories and assessment inventories conceptualize body image as multidimensional. To date, the body-image construct consists of at least two basic aspects, perceptual and attitudinal (Cash & Brown, 1987; Keeton, Cash, & Brown, 1990). The perceptual component deals with size estimation accuracy, in terms of actual body size compared with ideal body size. The attitudinal component consists of affective, cognitive, and behavioral dimensions regarding physical appearance.

Perceptual approaches. There are two main categories of assessment instruments utilized to assess size-estimation accuracy: body part or site procedures and the distorting image (whole body) procedures (Cash & Brown, 1987). Site procedures require subjects to match the distance between two points, to their own perception of the width of a specific body area. The whole body procedures confront individuals with real self images which are distorted to either be larger or smaller than actuality. Images are reflected by mirror feedback, videotape, or photographic image (Thompson, Penner, & Altabe, 1990).

Individuals are responsible for selecting the image that matches their body-size perception.

Attitudinal approaches. The attitudinal component of body image includes affective, cognitive, and behavioral dispositions regarding one's bodily appearance. Individuals are generally assessed through self-report questionnaires measuring satisfaction and appearance-related thoughts, beliefs and behaviors. A popular measure utilized is the Multidimensional Body-Self Relations Questionnaire (MBSRQ; Brown, Cash, & Mikulka, 1990; Cash et al., 1986). This assessment inventory measures the attitudinal dispositions in terms of three somatic domains: physical aesthetics ("appearance"), physical competence ("fitness"), and biological integrity ("health"). Other attitudinal measures include the Body Cathexis Scale (BCS; Secord & Jourard, 1953), and the Body Parts Satisfaction Scale (Berscheid et al., 1973). These instruments assess body image as a constant, unchanging trait.

Another attitudinal instrument, the Situational Inventory of Body Image Distress (SIBID; Cash, 1994a), measures body image in different situations, detecting "state" body affect which may vary as a result of situational variables or environmental cues. These cues could be any situations that trigger negative body-image thoughts such as bodily exposure, social comparisons, eating, exercising, etc. Research findings demonstrate that body image is more than just a trait, it changes as a result of situational contexts (Cash, 1994; Cash & Brown, 1987; Cash & Pruzinsky, 1990).

The subjective experience of the body differs considerably from the objective appearance of the body. Negative body image is more affected by cognitive beliefs, interpretations, and situations than by actual physical realities (Cash, 1990b).

Physiological Benefits of Exercise

Physical exercise is an important factor in developing and maintaining health. There is accumulating evidence (Abbott, Levy, Kannell, Castelli, Wilson, Garrison, & Stokes, 1989; Dannenberg et al., 1989; Duncan et al., 1991) that it reduces the risk of coronary heart disease (CHD), which continues to be the number one cause of death in North America (Abbott et al., 1989).

In 1948, the Framingham Heart Study (Dawber, Gilcin, Meadors, & Moore, 1951) began as a prospective investigation of cardiovascular disease in a cohort of 5,209 adult women and men. Continuous surveillance of this sample has been maintained via biennial physical examinations. Castelli reported (1984) that in general, physically active Framingham subjects fared better than non-active subjects for virtually every manifestation of coronary heart disease. However at the time few cohort subjects participated in vigorous activities such as jogging, aerobics or swimming, and therefore the benefits of physical exercise on CHD have primarily been analyzed in the second generation, the Framingham offspring (Abbott et al., 1989; Dannenberg et al., 1989: Feinleib, Kannel, Garrison, McNamara, & Castelli, 1975).

In one study (Abbott et al., 1989) 2,606 healthy Framingham offspring were given submaximal treadmill tests to determine the relationship between exercise endurance and cardiovascular risk factor profiles. Researchers found, for both women and men, that exercise endurance was significantly inversely related to resting heart rate, body mass index, systolic blood pressure and blood glucose, and positively related to high density lipoprotein (HDL) cholesterol. In men, cigarette smoking, high levels of total cholesterol, and very low density lipoprotein (VLDL) were also associated with poor exercise endurance. In another study, Paffenbarger, Hyde, Wing, and Hsieh (1986) followed the health of Harvard alumni for up to 40 years. Lower death rates were found among the physically active men. Mortality rates were 15-20% lower for men who burned as few as 500 calories a week through exercise compared with more sedentary men.

The benefits of exercise are also evident in the prevention and control of hypertension (Hagberg, Montain, Martin, & Ehsani, 1989; Martin, Dubbert, & Cushman, 1990). In another Harvard alumni study, Paffenbarger, Wing, Hyde, and Jung (1983) followed subjects 16-50 years after college entrance. Findings revealed alumni were more likely to be hypertensive if they were not currently engaging in strenuous physical activity. Martin et al. (1990) found a significant decrease in diastolic and systolic blood pressure among mildly hypertensive men after completing an aerobic training program, compared to a sedentary control group. Blood pressure changes were not associated with any significant changes in weight, body fat, urinary electrolytes, or resting heart rate, indicating that physical exercise has an independent lowering effect on blood pressure in mildly hypertensive men.

Many researchers have also studied the relationship between exercise and lipoprotein cholesterol (Burke, Sprafka, Folsom, Hahn, Luepker, & Blackburn, 1991; Lee, Nieman, Raval, Blankenship, & Lee, 1991; Wilson, 1990). One recent study (Duncan et al., 1991) examined the effects of walking on lipoprotein profiles. Researchers randomly assigned 102 sedentary women to one of four groups; aerobic walkers, brisk walkers, strollers, or sedentary controls. Walking distance and frequency were kept constant for the 24-week training period. Compared to the control group, maximal oxygen uptake increased significantly in a dose-response manner (aerobic walkers > brisk walkers > strollers). Additionally, high-density lipoprotein cholesterol concentrations increased significantly among two out of the three training groups. The researchers concluded that moderate and vigorous exercise can improve lipoprotein profiles for women.

Furthermore, appropriate physical activity is a valuable component in the therapeutic regimen to control and treat other conditions such as; obesity (Tremblay, Despres, Maheux, Pouliot, Nadeau, Moorjani, Lupien, & Bouchard, 1991), musculoskeletal disorders (Simmons, 1987), cancer (Ballard, Schatzkin, Albanes, Schiffman, Kreger, Kannel, Anderson, & Helsel, 1990), and diabetes (Manson, Rimm, Stampfer, Colditz, Willet, Krolewski, Rosner, Hennekens, & Speizer, 1991; Vanninen, Uusitupa, Siitonen, Laitinen, & Lansimies, 1992). Most health professionals are optimistic regarding the benefits of exercise on physiological health.

Psychological Benefits of Exercise

Generally it has been assumed that "a healthy body is a healthy mind." However in the past two decades scientific literature has mounted questioning the therapeutic effects of exercise on psychological health. Books (Berger, 1984; Morgan & Goldston, 1987) and review articles (Folkins & Sime, 1981; ISSP, 1992; Leith & Taylor, 1991; Sonstroem, 1982) have been published delineating the relationship between exercise and psychological well-being.

The psychological effects of exercise have been assessed for a range of variables including depression, anxiety, cognitive function, and self-esteem (Brandon & Loftin, 1991; Folkins & Sime, 1981; Morgan & Ellickson, 1990; Stein & Motta, 1992). Physiological theories relate psychological benefits to the release of morphine-like chemicals (endorphines) in the brain resulting in a sense of mental well-being (Carr, Bullen, Skrinar, Arnold, Rosenblatt, Beitins, Martin, & McArthur, 1981; Farrell, Gates, Maksud, & Morgan, 1982). Cognitive theories relate affective changes to cognitive appraisals of the training effects relative to various social and psychological variables (Beck, Rush, Shaw, & Emery, 1979).

In a recent controlled study, Stein and Motta (1992) compared the effects of aerobic swimming and nonaerobic weight training on depression and self-concept, in a nonclinical sample of undergraduate college students. Both exercise groups met biweekly for a 7-week duration. While only the aerobic group improved on measures of cardiovascular fitness, measured by the "Twelve Minute Swim" (Cooper, 1977), both the aerobic and nonaerobic exercise group experienced a significant reduction in depression relative to the control group. On measures of overall self-concept, the nonaerobic group showed a significant increase while the aerobic and control group did not. This finding contradicted an early study (Ossip-Klein, Doyne, Bowman, Osborn, McDougall-Wilson, & Neimeyer, 1989), which found significant improvements in self-concept for aerobic and nonaerobic exercisers relative to a control group.

In another study using randomized trials, Martinsen, Hoffart, and Solberg (1989b) compared aerobic with nonaerobic exercise in the treatment of clinical depression. Both groups exercised three times a week for 8 weeks. While only the aerobic condition improved on measures of maximal oxygen uptake (VO2 max), measured by a submaximal treadmill test, depression scores in both groups were significantly reduced on posttest measures.

The effects of physical exercise on acute and chronic anxiety have also been investigated by researchers (Berger & Owen, 1987; Cramer, Nieman, & Lee, 1991; Hannaford, Harrell, & Cox, 1988;). Martinsen, Hoffart, and Solberg (1989a) studied the effects of aerobic and nonaerobic exercise in an anxiety disordered population. After 8 weeks of exercise, only the aerobic group increased in cardiovascular fitness, measured by maximal oxygen uptake. However, both exercise groups significantly reduced their scores on three anxiety measures. This finding lends support for the potential use of both aerobic and nonaerobic exercise in enhancing mental health.

Recently, Leith and Taylor (1991) conducted a computer search spanning the previous 10 years of literature on the relationship between physical exercise and psychological health. The search revealed 81 data-based studies examining the relationship between the two constructs. The results indicated that 70% of the studies reported significant improvements in psychological health as a result of physical exercise. While these results are encouraging, caution is advised in interpreting the findings. When the studies are examined by design category, 80% of the pre-experimental and quasi-experimental studies reported significant findings, compared with only 50% of the true experimental designs. This discrepancy indicates that as research studies become more controlled, the positive effects of exercise become less apparent. Documentation of actual fitness changes is also lacking in approximately half of the studies. Among the studies documenting changes, many failed to report the frequency, intensity, and duration of the exercise.

Other studies investigating the effects of exercise on mental health have also been criticized for analyzing global psychological constructs of personality such as self-esteem (Harter, 1983; Rosenberg, 1979). A major advancement in self-esteem theory was the widespread acceptance of its multidimensionality (Fox & Corbin, 1989; Marsh, Richards, & Barnes, 1989; Shavelson, Hubner, & Stanton, 1976; Sonstroem, Speliotis, & Fava, 1992). Theorists profess that various facets of self-esteem be analyzed, as opposed to global self-esteem. For example, Shavelson et al. (1976) embraced a model of global self-concept in which several subordinate constructs are examined. One construct identified was physical self-concept, which encompasses physical ability and physical appearance. Similarly, Fox and Corbin (1989) designed a multidimensional model for assessing physical self-esteem, which encompasses four subscales; sports competence, attractive body, physical strength, and physical condition. Research indicated that these subscales are independent but correlated latent constructs (Sonstroem, Speliotis, & Fava, 1992).

In conclusion, current literature suggests the potential use of exercise as a tool for enhancing mental wellness (ISSP, 1992; Leith & Taylor, 1991). Poor methodological procedures, lack of assessing fitness changes, and the analysis of global psychological constructs are largely responsible for the inability to state unequivocally whether or not exercise has positive psychological benefits.

The Relationship Between Body Image and Exercise

As global self-esteem is currently viewed as multidimensional (Fox & Corbin, 1989; Marsh et al., 1989; Sonstroem et al., 1992), physical self-esteem (i.e., body image) provides a logical facet to analyze the psychological effects of physical exercise. Whereas this topic has intuitive appeal, researchers investigating this relationship have failed to reach conclusive findings. Researchers have explored the role of physical exercise in both overcoming (Adame, Johnson, Cole, Matthiasson, & Abbas, 1990; Fisher & Thompson, 1992; Skrinar, Bullen, Cheek, McArthur, & Vaughan, 1986) and contributing to (Davis, 1990a, 1990b; Katz, 1986; Kron et al., 1978) a negative body image. Several studies deserve mention as having assessed body image in relation to or as a result of exercise.

Skrinar and associates (1986) compared body image among 15 sedentary female subjects, ages 20-30, before and after an intensive 8-week running program, relative to a control group. Private body consciousness, public body consciousness, and body competence were measured by the Body Consciousness Questionnaire (Miller, Murphy, & Buss, 1981). In addition, fitness variables were assessed including hydrostatic weighing for determining body fat, and maximal oxygen uptake (VO2 max) for cardiovascular fitness. The authors reported that body composition, cardiovascular fitness, private body consciousness, and body competence were significantly altered by the training program. Training did not induce changes in public body consciousness. The researchers concluded that fitness changes are related to increased awareness of bodily functions and perceived competence which can enhance overall self-concept.

While these results appear optimistic, certain caveats must be considered. Of the original 15 training-group subjects, only 10 completed pre and post-test measures due to subject attrition. Attrition rates were not reported for the control group. Additionally, researchers assumed training and control group equivalence in the absence of randomization procedures. Although significant results were reported causal inferences are questionable.

In a similar exercise-based study, Ben-Shlomo and Short (1986) compared body image and self-concept among 15 sedentary women, ages 21-45, before and after a 6-week aerobic training program, relative to nonexercising controls. Subjects were pretested on three subscales of the Tennessee Self-Concept Scale (TSCS; Fitts, 1964) (i.e., physical self, self satisfaction, and personal self), the Body Cathexis Scale (BCS; Secord & Jourard, 1953), and cardiovascular fitness, measured by VO2 max. Subjects were then matched by age, weight, and fitness level and randomly assigned to either an exercise (arm or leg aerobic training) or nonexercise group for 6 weeks. Researchers report that cardiovascular fitness, physical self, and self-satisfaction were all altered significantly as a result of physical exercise. Changes for the BCS scale and TSCS personal self subscale were not significant. The authors conclude that an aerobic conditioning program has psychological benefits.

Regardless of researchers' attempt to control extraneous variables via experimental procedures, methodological limitations are evident. Again a small number of subjects jeopardize generalizing these results. Conducting statistical tests on data with few subjects is also problematic with respect to high Type II error rates. While matching procedures were utilized to equate the groups, uncertainty exists regarding whether the most appropriate variables were selected for matching subjects. Finding suitable matches among such a small number of subjects is an additional concern. And finally, the reasonableness physiological and psychological alterations after only 6 weeks of exercise training is questionable. Longer training periods are advisable for future research.

Adame and associates (1990) assessed the level of physical fitness among 243 college freshman to determine the relationship to (1) amount of exercise, (2) body image, (3) locus of control and (4) gender. Students enrolled in an introductory personal health course were administered the Hall Physical Fitness Test Profile (1986), the Winstead and Cash (1984) Physical Fitness Subscale of the Body Self-Relations Questionnaire, and the Adult Nowicki-Strickland Locus of Control Scale (Nowicki & Duke, 1974). Additionally, subjects estimated the hours they spent exercising on a 9-point scale ranging from no regular exercise to 10 or more hours per week. The authors concluded that internally oriented subjects were more fit than externally oriented subjects, and subjects with a good fitness-related body image were more physically conditioned than those with poor fitness-related body image.

These results are useful for establishing significant relationships among variables which can be tested further through experimental research. However, the correlational approach to research has limitations with respect to causal inference. Another noteworthy limitation is the questionable reliability and validity of exercise self-report.

More recently, Fisher and Thompson (1994) compared combined aerobic/anaerobic exercise therapy to group cognitive behavioral therapy for treating body-image disturbances in college females ages 17-45. Building on the findings of Cash and Butters (1987) and Rosen, Cado, Silberg, Srenbnik, and Wendt (1990), the authors attempted to compare an established psychological method for improving body image with an exercise intervention.

Fifty-four white females were randomly assigned to one of three groups: cognitive behavioral therapy (CBT), exercise therapy (ET), or control condition (C). Cognitive, affective, perceptual, and behavioral aspects of body image were assessed. Two therapy waves occurred for each treatment category. The CBT consisted of 6 sessions of information and rationale for treatment, concerning body dissatisfaction. Body-image tapes were provided to subjects for home use. The ET consisted of one session of body-image and exercise education, followed by five sessions of aerobic exercise and weight lifting conducted by a certified health instructor. Subjects were instructed to repeat exercises biweekly via exercise video tapes.

Findings revealed that, relative to the control group, both ET and CBT scores significantly decreased from pretest to posttest on body-image anxiety, body dissatisfaction, and depression. There were significant decreases in body-image avoidance behaviors, size overestimation, and bulimic symptomatology for all three groups.

Due to a high attrition rate, ET and CBT groups were combined for follow-up analysis. At 3-month follow-up, treatment gains were maintained for body-image anxiety and overall body dissatisfaction, however not for depression, relative to the control group.

In conclusion, Fisher and Thompson (1994) report that cognitive-behavioral therapy and exercise therapy revealed equivalent results, reducing body-image anxiety, cognitive and behavioral aspects of body image, overall body dissatisfaction, and depression level. The authors suggest utilizing physical exercise combined with cognitive-behavioral therapy for treating body-image disturbances. Aware of the follow-up limitations regarding attrition rate and lack of separate information for treatment conditions, they encouraged further investigations with larger sample sizes and a combined treatment group of CBT and ET be analyzed. It should also be mentioned that physiological variables, such as cardiorespiratory fitness and body composition, were not assessed in the study. Additionally, exercise therapy as treatment for body-image disturbance mat be questioned by some as being problematic by reinforcing the sociocultural bias toward thinness and appearance.

The previously discussed four articles provide encouragement for the potential use of exercise in enhancing body-image satisfaction. However some researchers have studied the antithetical possibility--that participation in an exercise program may foster body narcissism and encourage dieting behaviors and weight preoccupation (Katz, 1986). Theoretically, exercise evokes certain biological and sociological reinforcers which can result in an unhealthy investment in the body. Furthermore, Kron et al. (1978) studied hospitalized anorectics and reported that 25 of the 33 patients excessively engaged in physical exercise, and that 21 of the 25 were extremely active preceding dieting or weight loss.

More recently, Davis and her associates have published a host of studies analyzing the role of physical exercise in the development of negative body image and unhealthy weight and dieting behaviors (Davis, 1990a; Davis, 1990b; Davis, 1992; Davis & Cowles, 1989; Davis, Fox, Cowles, Hastings, & Schwass, 1990). In one study, Davis (1990a) analyzed the relationship between certain personality characteristics and weight, dieting behaviors, and bodily appearance concerns among exercising versus nonexercising women. Multiple regression analysis revealed for the exercising group that subjective body shape, not body mass index (BMI), influenced weight preoccupation. The opposite was found for nonexercisers. Low body satisfaction was also related to poorer emotional well-being for the active group, whose bodily appearance was more important to self-esteem than was true of inactive individuals. Davis recognized the possibility that excessive preoccupation with weight and bodily appearance may lead women to exercise vigorously. However, she argued that exercise fosters a heightened degree of body-image focus and a distorted impression of one's body size which may lead to an obsessive attitude toward weight control.

In a similar study, Davis et al. (1990) analyzed physical exercise in relation to dieting practices and excessive concern with body weight among 112 exercising college females. A structural equation model analyzed the following variables: weight and dieting concerns, physical activity, emotional reactivity, age, BMI, and exercise concerns. Results indicate that BMI, emotional reactivity, and physical activity have statistically significant effects on weight and dieting concerns. However, weight and dieting concerns did not significantly affect physical exercise participation. The authors concluded that engaging in physical exercise routinely is related to excessive concerns with weight and dieting.

While this theory has intuitive appeal caution is advised in interpreting the findings. The structural equation model makes several assumptions regarding the data entered into the analysis. Subsequent analysis should be obtained via experimental procedures.

Although causal inferences and generalizations to other populations are unwarranted in these studies, similar results have been obtained when analyzing men (Davis, Elliot, Dionne, & Mitchell, 1991) and female athletes (Davis, 1992; Davis & Cowles, 1989; Rosen & Hough, 1988).

Despite increased awareness, consensus has not been reached regarding the effects of physical exercise on body image. The implications of research investigating this relationship are readily apparent. Physical exercise has the potential to enhance psychological wellness. As such, it warrants most serious consideration.

CHAPTER 3

Research Methodology

Subjects

The initial sample for this study consisted of 91 women, all urban college students from a public southeastern university. Approximately one-third of the subjects (n = 31) were recruited from general requirement university classes and were offered two research credits in exchange for completing the study. This phase of subject recruitment screened for females with a sedentary lifestyle, defined as no participation in aerobic activities for at least 6 months prior to commencement of the study. The remaining subjects (n = 60) were recruited from two introductory physical education aerobic dance courses offered by the university and awarded two academic credits.

Those women who met the following inclusionary and exclusionary criteria were utilized for the study: (1) The student agreed to participate in a doctoral research study including testing of psychological and physiological variables. (2) The student denied orthopedic, respiratory, cardiopulmonary and neurological disorders. (3) The student denied utilizing medications for psychological disorders. (4) The student was not pregnant. (5) The student was between the ages of 17-47.

Of the 91 subjects who meet the criteria, the mean age was 21.6 (SD = 5.3), and the age range was from 18 to 46 years. Fifty-four subjects were White, 26 were African American, 9 were Asian, and 2 were of other ethnic origins.

These 91 subjects comprised three groups: Subjects screened for an aerobically sedentary lifestyle constituted the sedentary control group (SC). The remaining 60 exercising subjects were randomly assigned to one of two groups, exercise training with state body-image assessment immediately after exercise (ET-I), or exercise training with delayed state body-image assessment one day after exercise (ET-D). These two groups initially consisted of 33 and 27 subjects respectively. This difference was due to 6 exercising subjects dropping the course during the first week of the semester (i.e., before pretesting but after group assignments).

Over the course of the semester (i.e., pretest to posttest), 3 exercising subjects and 2 sedentary control subjects were lost to attrition. The exercisers left the study as the result of dropping out of school or dropping the class because of needing more time to study. The 2 sedentary control subjects completed pretesting and posttesting but were dropped from data analysis because they began a regular aerobic exercise program over the course of the investigation. After attrition, the groups consisted of 29 SC subjects, 31 ET-I subjects, and 26 ET-D subjects.

Pretesting Orientation and Assessment Procedure

Subjects from each group who met all inclusionary and exclusionary criteria participated in an orientation and pretreatment session. At this session, a description regarding the topic and the importance of the project was discussed. Anonymity was ensured through nominal coding of all test data. Subjects were also informed about any possible risks to their health and well-being, all with the understanding that they could end participation in the project at any time without penalty or fear of prejudice. After all questions had been answered, subjects gave their written informed consent to participate in the study. Subjects who were under the age of 18 provided written parental consent for participation.

Subsequently, subjects completed test packets. The ET-I and the ET-D subjects completed packets including the following instruments: Multidimensional Body-Self Relations Questionnaire, Reasons for Exercise Inventory, and a demographic sheet. The SC subjects completed the same inventories with the exception of the Reasons for Exercise Inventory. The REI inquires about reasons for participation in exercise programs, and therefore is inappropriate for sedentary individuals. These instruments and informational sheets are included in Appendix A-C.

Upon completion of the psychological measures, subjects were assessed with the following physiological procedures: Bioelectrical impedance analysis for determining body composition, and the Queens College step test for determining cardiorespiratory fitness.

The subjects' body composition was determined first. Bioelectrical impedance was used to determine body composition, by a localized 50KHz current-injection method (Valhalla Scientific, San Diego, CA. Model 1990 B). After subjects' weight and height were measured, body composition measurements were taken with subjects in a supine position with their limbs abducted 35 to 45 degrees from the body. Current-injection electrodes were placed at the phalangeal-metacarpal joint on the middle of the dorsal side of the right hand and 1/4 inch below the transverse (metatarsal) arch on the superior side of the right foot. Detector electrodes were placed on the midline of the posterior side of the right wrist at the level of the pisiform bone and ventrically across the medial malleolus bone on the left ankle with the foot semiflexed. Resistance (R) to the flow of the 50KHz injected current was measured on a 0 - 1023 ohm scale, and reactance (Xc) was measured on a 0 - 200 ohm scale. Further information on quantification is provided below in the "Dependent Measures" section.

Subsequently, each subject completed the Queens College step test, a submaximal exercise test of bench stepping to determine cardiorespiratory fitness. First, subjects' resting heart rates were taken for 30 seconds, by utilizing manual palpation of the radial artery at the wrist. This number was multiplied by 2 to determine actual resting heart rate per minute. Subjects were then instructed to begin a four-step cadence "up-up-down-down" on a bench (16 1/4 inches high) for 3 minutes to the beat of an electric metronome set at 88 beats per minute. Following the 3-minute step test, another palpated radial artery heart rate was measured for a 15-second period of time, 15 seconds into recovery. Recovery heart rates were converted into beats per minute (15-second heart rate X 4) and compared to established percentile rankings.

<u>Exercise Training Procedure</u>

The two exercise treatment groups, ET-I and ET-D, participated in aerobic dance exercise treatment classes 3 hours a week for 13 weeks. Taken for academic credit, these aerobic dance classes convened during morning hours in the Fine and Performing Arts Building on the Old Dominion University campus in Norfolk, Virginia. Both classes were conducted in the same room containing aerobic flooring, wall-to-wall mirrors, ceiling fans, and adequate temperature control. The exercise classes consisted of a combination between low and high impact aerobic dance regimen geared toward strengthening the cardiorespiratory system. These classes were taught by the present investigator. She is an exercise professional with extensive training, and over 10 years experience instructing health and physical fitness related classes at the collegiate level. The researcher was blind to the subject's exercise condition, as well as the testing procedures.

Class components included: 8-10 minutes of rhythmic warm-up and stretching, 20-30 minutes of aerobic exercise gradually increasing in intensity and duration throughout the semester, 8-10 minutes of aerobic cool-down, 10 minutes of muscular strength and endurance exercises, and 5-8 minutes of cool-down and stretching. Participants' exercise intensity was monitored through maximum heart rate measures. Participants exercised between 60-85% of their maximum heart rates (220 minus age) during the aerobic segment of the class. Heart rates were assessed by manually palpating either the carotid or radial artery. Heart rates were determined to be below 120 beats per minute before engaging in muscular strengthening exercises, and were reduced to resting rates by the final cool-down.

For ethical reasons, the sedentary control subjects were not asked to refrain from physical exercise during the course of the study. However, it was intended that they would continue with their sedentary lifestyle. At the end of 13 weeks, the control subjects were administered a questionnaire regarding physical exercise habits over the study time period. Those two control subjects who did engage in physical exercise were dropped from data analysis.

State Body-Image Assessment Procedures

Throughout the 13-week training period, subjects from all three groups (ET-I, ET-D, and SC) were assessed on the state body-image measure on four occasions, using an adapted administration of the Body Areas Satisfaction Scale (BASS), a subscale of the MBSRQ. This assessment takes about 1 minute. The administration of the BASS occurred during Week 3, Week 6, Week 10, and Week 13. A yoked controlled administration of the BASS was conducted. The ET-I group completed the BASS immediately after exercise; and the ET-D group completed the BASS the following sedentary morning at the same time. The SC subjects were contacted by telephone and told to complete the BASS during the same weeks and at the same times as the ET-I and ET-D groups. The SC subjects immediately returned their state body-image questionnaires to the researcher via the peer adviser at the Psychology Department at Old Dominion University.

Posttesting and Follow-up Procedures

Posttesting procedures occurred the week following treatment (Week 14). All instruments and physiological assessments previously completed during pretesting sessions were retaken at posttest and follow-up sessions. In addition, control subjects completed a questionnaire regarding any exercise participation over the study period.

Follow-up assessments for all three conditions occurred the following semester, 9-10 weeks after the posttesting session. Subjects were contacted to schedule a session to complete all instruments and physiological assessments previously completed at posttest. In addition, an interview was conducted with all subjects to determine exercise patterns between posttest and follow-up. This study's design is presented in Table 1.

Research Assistants

The same research assistants remained from pretest through follow-up. The one male assistant responsible for administering the psychological instruments was a graduate from Old Dominion University in psychology. The other three female assistants responsible for exercise testing were undergraduate and graduate students in the fields of sports medicine or exercise science, and were certified by the American College of Sports Medicine for fitness testing.

Table 1

Design of the Study

Week														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	23 - 24
1	1	X3	X	X	X3	X	X	X	X3	X	X	X3	2	4

Note. 1 = Pretest Assessment

2 = Posttest Assessment

3 = State Assessments

4 = Follow-up Assessments

X = Treatment Sessions for Exercise Groups

Dependent Measures

Multidimensional Body-Self Relations Questionnaire (MBSRQ) (Cash, 1994b). The MBSRQ is 69-item self report inventory assessing the attitudinal dimension of body image. Norms were established based on a stratified random sample (sex-by-age distribution) of the U. S. population (Cash, Winstead, & Janda, 1986). The sample consisted of 996 males and 1070 females. The principal subscales evolved from factor analytic studies (Brown et al., 1990) that confirmed the following conceptual dimensions of the MBSRQ: Appearance Evaluation, Appearance Orientation, Fitness Evaluation, Fitness Orientation, Health Evaluation, Health Orientation, and Illness Orientation. Additional reliable and valid MBSRQ subscales included the Body Areas Satisfaction Scale (BASS), Overweight Preoccupation, and Self-Classified Weight. Appearance Orientation, Illness Orientation, and Self-Classified Weight scales were excluded from analysis as less pertinent in this study and as a partial protection against testwise error inflation.

The Appearance Evaluation subscale consists of seven 5-point Likert-scale items measuring beliefs and feelings regarding one's physical attractiveness or unattractiveness and satisfaction or dissatisfaction with appearance. High scores represent positive evaluations of physical appearance and low scores represent negative evaluations of appearance. For the Appearance Evaluation subscale internal consistency is .88, and 1-month test-retest reliability is .91 (Cash, 1994b).

The Fitness Evaluation subscale consists of three Likert-scale items measuring feelings of physical fitness. High scores indicate self-appraisals of being "in shape" or athletically competent. Low scores indicate feeling "out of shape" or athletically incompetent. The reported alpha coefficient for the Fitness Evaluation subscale is .77, and 1-month test-retest reliability is .79 (Cash, 1994b).

The Fitness Orientation subscale consists of 13 Likert-scale items that measure level of investment in being physically fit. High scores indicate one's active involvement in physical exercise to enhance or maintain fitness levels. Low scores indicate apathy regarding physical fitness and a corresponding sedentary lifestyle. The reported alpha coefficient for the Fitness Orientation subscale is .90 and 1-month test-retest reliability is .94 (Cash, 1994b).

The Health Evaluation subscale consists of six Likert-scale items which measure feelings regarding physical health. High scores indicate appraisals of good health. Low scores indicate feelings of vulnerability to poor health or illness. The reported alpha coefficient for the Health Evaluation subscale is .83, and 1-month test-retest reliability is .79 (Cash, 1994b).

The Health Orientation subscale consists of eight Likert-scale items that measure level of investment in a physically healthy lifestyle. High scores represent a healthy lifestyle, and low scores indicate apathy regarding personal health maintenance. The reported alpha coefficient for the Health Orientation subscale is .78, and 1-month test-retest reliability is .85 (Cash, 1994).

For the purposes of this study, in order to reduce Type I error, the Fitness Orientation and the Health Orientation subscales were collapsed for data analysis, given their association (r = .66). Likewise, the 3-item Fitness Evaluation subscale and the 6-item Health Evaluation subscale were also collapsed (their r was .36). These two new combined subscales are internally consistent, with Cronbach's alpha in this study of .89 for Fitness/Health Orientation and .74 for Fitness/Health Evaluation.

The Body Areas Satisfaction Scale (BASS) consists of nine Likert-scale items which tap feelings of satisfaction or dissatisfaction with specific aspects of one's appearance (eg., face, hair, lower torso, muscle tone, etc., plus an overall-appearance item). High scores indicate satisfaction with most aspects of one's physical appearance, whereas low scores indicate dissatisfaction. The mean composite body satisfaction index is calculated by averaging ratings of eight items (excluding the overall appearance item). The reported alpha coefficient for the BASS is

.78 (Cash, 1989; Cash & Brown, 1989) and 1-month test-retest reliability is .73 (Cash, 1994b).

In addition to using the BASS as a measure of trait body image, an adapted version of this measure was also administered to assess feelings regarding temporary state body image as a result of the exercise experience. The eight Likert-scale items regarding specific aspects of one's appearance, plus the one item measuring overall appearance assessed individuals' body-image satisfaction immediately following exercise. Instead of indicating how generally satisfied or dissatisfied they are with specific aspects of appearance, subjects indicate how satisfied or dissatisfied they are at that particular time (see Appendix C for the state-BASS and its instructions).

The Overweight Preoccupation subscale consists of four Likert-scale items which measure fat anxiety, weight vigilance, current dieting, and eating restraint (Cash, Wood, Phelps, & Boyd, 1991). High scores represent anxious concern with small changes in body weight and extensive weight-control dieting. Low scores represent little awareness of body weight changes and rare eating restraint. The reported alpha coefficient for the Overweight Preoccupation subscale is .73, and 1-month test-retest reliability is .89 (Cash, 1994b).

The Reasons for Exercise Inventory (REI) (Silberstein et al., 1988, 1989). This 25-item inventory assesses the reasons that individuals exercise. The items are arranged to represent seven a-priori dimensions assumed by the authors: exercising for weight control, for fitness, for health, for improving body tone, for improving overall physical attractiveness, for improving mood, and for enjoyment. However, a recent factor analytic study (Cash, Novy, & Grant, 1994) conducted on a sample of 101 women revealed a different factor structure for the Reasons for Exercise Inventory (modified by one additional item) than assumed originally. Four factors were identified: Appearance/Weight Management, Fitness/Health Management, Stress/Mood Management, and Socializing. Alpha reliability coefficients for each factor range from .73 to .91. Novy and Cash (1995) have replicated this factor structure for both sexes.

The Queens College Step Test (McArdle, Katch, Pechar, Jacobson, & Ruck, 1972). The submaximal exercise test of bench stepping is a practical and effective way to classify individuals in terms of cardiorespiratory fitness (Brouha & Savage, 1944; Francis & Brasher, 1992; Francis & Culpepper, 1989; Francis & Feinstein, 1991; McArtle, Katch & Katch, 1991; Shapiro, Shapiro, & Magazanik, 1976). With the application of "prediction equations" to the step-test results, aerobic capacity or VO2 max can be estimated with a fare degree of accuracy

(Francis & Brasher, 1992; Francis & Feinstein, 1991; McArdle et al., 1991). In terms of accuracy of predicting VO2 max, one can be 95% confident that the predicted VO2 max will be within +/- 16% of the true VO2 max of the individual tested (McArdle et al., 1972, 1986, 1991). The index used as a dependent variable in this study was recovery heart rate. In the early stages of heart rate recovery after exercise, an individual's heart rate response differs dramatically depending upon maximal oxygen uptake. The lower the heart rate response at recovery the higher the VO2 max (McArdle et al., 1986, 1991).

Bioelectrical Impedance Analysis (BIA). Bioelectrical impedance analysis provides a reasonably accurate estimate of body composition based upon the conduction of an applied electrical current through the conductive tissues of the body (Kushner, Kunigk, Alspaugh, Andronis, Leitch, & Schoeller, 1990). It is essential that total body water (TBW) be known for the reliable assessment of body composition from bio-impedance. Excellent correlations have been demonstrated between BIA, TBW (by isotope dilution), and hydrodensitometry in lean and obese adults (Schoeller & Kushner, 1989). Total body water predicted by deuterium isotope dilution TBW (the accepted "gold standard" for measuring TBW) correlated .95 when compared to BIA among healthy men (Lukaski, Johnson, Bolonchuk, & Lykken, 1985). In another study, BIA-TBW plus weight predicted deuterium isotope dilution TBW with

r = .99 and standard error of estimate = 1.75 liters, among obese and nonobese men and women (Kushner & Schoeller, 1986).

Other comparison studies revealed a high correlation between lean body and fat mass when BIA and hydrostatic weighing were compared (r=.98 and .95 in men and women respectively) (Lukaski, Bolonchuk, Hall, & Sider, 1986). Bioelectrical impedance also predicted change in fat mass with greater accuracy (to 0.4 kg) and precision (+/- 1.28 kg) than anthropometry procedures (to 0.8 kg and +/- 2.58 kg, respectively) (Kushner et al., 1990). The BIA index used as a dependent variable in this study was percentage of body fat. Body fat consists of fat mass and is determined from body weight. The remainder of body weight is referred to as fat-free mass or lean mass (i.e., all body tissue except fat).

Chapter 4

Results

Data Analytic Strategy

Organization of dependent variables. Based on conceptual and empirical criteria (Grant & Cash, 1995), some dependent measures were divided into three small clusters for initial multivariate analysis. These three clusters include: (1) appearance-related body-image measures (i.e., MBSRQ Appearance Evaluation, MBSRQ Body Areas Satisfaction Scale, and MBSRQ Overweight Preoccupation), (2) fitness and health body-image measures (i.e., MBSRQ Fitness/Health Orientation and MBSRQ Fitness/Health Evaluation), and (3) physiological fitness measures (i.e., from the bioelectrical impedance analysis and cardiorespiratory step test). As Table 2 summarizes, empirical correlations revealed that the clusters were appropriate with generally moderate intra-cluster associations.

Plan for data analysis. This study utilized a mixed (groups by repeated measures) experimental/quasi-experimental design. Initial ANOVA procedures were computed to detect any pretest differences between exercisers and controls and also as a function of timing of exercisers' state body-image assessments (i.e., ET-I versus ET-D).

Table 2

Dependent Variable Clusters Used for Data Analysis

Variable Cluster	Dependent Measures
1. Appearance-related Body-Image Variables (Range of absolute rs = .35 to .70)	MBSRQ Appearance Evaluation MBSRQ BASS MBSRQ Overweight Preoccupation
2. Fitness/Health Body-Image Variables (r = .53)	MBSRQ Fitness/Health Evaluation MBSRQ Fitness/Health Orientation
3. Physiological Fitness Variables (r = .35)	Queens College step test Bioelectrical Impedance Analysis

Moreover, because preliminary analyses revealed comparable findings for ET-I and ET-D groups, these two treatment conditions were collapsed for further data analysis procedures comparing the exercising and sedentary subjects on trait body image and physiological indices.

Mixed multivariate analysis of variance (MANOVA) and analysis of variance (ANOVA) were utilized to analyze the data. Within and between-group comparisons were conducted on the five sets of dependent variables using the following analyses: (1) state body image, with a 3 (All Groups) x 4 (Assessment Time) mixed ANOVA; (2) trait appearance-related body image, with a 2 (ET versus SC Groups) x 2 (Assessment Time) mixed MANOVA; (3) trait fitness/health-related body image, with a 2 (ET versus SC Groups) x 2 (Assessment Time) mixed MANOVA; and (4) physiological fitness, with a 2 (ET versus SC Groups) x 2 (Assessment Time) mixed MANOVA. When MANOVAs revealed significant findings, univariate $\underline{F}$ tests were examined to determine which variable or variables displayed main or interactive effects. The multivariate alpha was set at $\underline{p} < .05$, and the univariate alpha was set at $\underline{p} < .01$.

Preceding an examination of the maintenance of treatment outcomes at follow-up, analysis of attrition and self-selection were conducted. Dependent upon these findings, analysis of variance compared participants' pretest to follow-up measures.

Finally, a correlational analysis was conducted to examine the relationships between motives for exercise and body-image changes among the exercisers. Other exploratory correlational analyses examined other possible predictors of body-image change.

Comparisons between Treatment Conditions at Pretest

Pretest comparisons of the ET-I and ET-D conditions revealed that these two groups were not significantly different on any pretest variables, indicating that random assignment procedures were successful in equating the two groups. Table 3 provides means and standard deviations regarding pretest variables for these two treatment conditions.

Further examination of pretest group differences was done for the collapsed treatment group compared with the sedentary control group. Results revealed the two groups were comparable on all but one pretest variable, the cardiorespiratory fitness test, F (1, 84) = 10.84, $p < .01$. Specifically, subjects who had enrolled in the exercise class had lower recovery heart rates (M = 168.35; SD = 15.64) compared to the sedentary control group (M = 181.52; SD = 20.80). This indicates that at pretest the subjects in the exercise treatment group were somewhat more cardiovascularly fit than the sedentary control group.

Table 3

Exercise Training Group Comparisons on Pretest Variables: Means, Standard Deviations, and F Ratios

Variable/Condition	M (SD)	F Ratio
Age		1.16
ET-I	20.7 (1.97)	
ET-D	22.1 (6.57)	
MBSRQ Appearance Evaluation		< 1
ET-I	3.20 (0.73)	
ET-D	3.10 (0.84)	
MBSRQ BASS		< 1
ET-I	3.10 (0.60)	
ET-D	3.00 (0.78)	
MBSRQ Overweight Preoccupation		< 1
ET-I	3.00 (1.00)	
ET-D	2.75 (0.89)	

[Table 3 continued on next page]

Table 3 (continued)

Exercise Training Group Comparisons on Pretest Variables: Means, Standard Deviations, and F Ratios

Variable/Condition	M (SD)	F Ratio
State BASS		< 1
ET-I	3.17 (0.65)	
ET-D	3.10 (0.68)	
MBSRQ Fitness/Health Evaluation		< 1
ET-I	3.61 (0.66)	
ET-D	3.65 (0.55)	
MBSRQ Fitness/Health Orientation		< 1
ET-I	3.24 (0.64)	
ET-D	3.30 (0.68)	
Body Composition		2.32
ET-I	26.62 (5.75)	
ET-D	29.12 (6.63)	

[Table 3 continued on next page]

Table 3 (continued)

Exercise Training Group Comparisons on Pretest Variables: Means, Standard Deviations, and F Ratios

Variable/Condition	M (SD)	F Ratio
Recovery Heart Rate		3.18
ET-I	165.03 (13.54)	
ET-D	172.31 (17.27)	

Table 4 provides means and standard deviations on the pretest variables for the ET and SC groups.

Prior to the analyses comparing the ET and SC groups over time, preliminary analyses (MANOVAs/ANOVAs) were conducted, as mentioned earlier, to examine whether the exercisers' results were influenced by the immediate versus delayed timing of the state body-image assessments. No reliable main effects or interaction effects (ET-I versus ET-D X Time) occurred for any dependent variable. Accordingly, subsequent analyses presented below collapsed across these two conditions.

Results for the Body-Image Trait Variables

Appearance body-image variables. It was hypothesized that subjects participating in the exercise training program would demonstrate significant positive pre- to posttest changes on the appearance-related body-image trait measures. Specifically expected were increases in participants' evaluation of their appearance (MBSRQ Appearance Evaluation), increases in their satisfaction with various body areas (MBSRQ BASS), and decreases in overweight concerns (MBSRQ Overweight Preoccupation). Significant changes were not expected on any of these outcome measures for the sedentary control group.

Table 4

Exercise Training and Sedentary Control Group Comparisons on Pretest Variables: Means, Standard Deviations and F Ratios

Variable/Condition	M (SD)	F Ratio
Age		< 1
ET	21.35 (4.67)	
SC	22.31 (6.75)	
MBSRQ Appearance Evaluation		< 1
ET	3.15 (0.81)	
SC	3.13 (0.71)	
MBSRQ BASS		< 1
ET	3.03 (0.68)	
SC	3.00 (0.61)	
MBSRQ Overweight Preoccupation		2.05
ET	2.90 (0.92)	
SC	2.60 (1.01)	

[Table 4 continued on next page]

Table 4 (continued)

Exercise Training and Sedentary Control Group Comparisons on Pretest Variables: Means, Standard Deviations, and F Ratios

Variable/Condition	M (SD)	F Ratio
State BASS		< 1
ET	3.13 (0.57)	
SC	3.13 (0.56)	
MBSRQ Fitness/Health Evaluation		2.41
ET	3.63 (0.61)	
SC	3.43 (0.49)	
MBSRQ Fitness/Health Orientation		3.70
ET	3.30 (0.65)	
SC	3.01 (0.50)	

[Table 4 continued on next page]

Table 4 (continued)

Exercise Training and Sedentary Control Group Comparisons on Pretest Variables: Means, Standard Deviations, and F Ratios

Variable/Condition	M (SD)	F Ratio
Body Composition		< 1
ET	27.76 (6.24)	
SC	27.44 (7.54)	
Recovery Heart Rate		10.84***
ET	168.35 (15.64)	
SC	181.52 (20.80)	

*** $p < .001$.

The 2 X 2 mixed MANOVA showed a significant main effect of time for these MBSRQ variables, F (3, 82) = 15.06, $p < .001$, as well as differential changes over time between the two conditions (i.e., Group X Time interaction), F (3, 82) = 11.54, $p < .001$. Significant univariate interactions occurred for all three variables--Appearance Evaluation, F (1, 84) = 6.97, $p < .01$; BASS, F (1, 84) = 19.56, $p < .001$; Overweight Preoccupation, F (1, 84) = 10.57, $p < .002$. Simple-effects analyses of this interaction revealed significant changes from pretest to posttest for the exercise group on Appearance Evaluation, F (1, 55) = 7.79, $p < .01$, on the BASS, F (1, 55) = 64.88, $p < .001$, and on Overweight Preoccupation, F (1, 55) = 36.03, $p < .001$. The sedentary control group showed no significant changes over time on any variable. Simple effects of groups at posttest indicated that exercisers had a more favorable appearance-related body image on the BASS, F (1, 84) = 11.14, $p < .001$, but not on either of the other two measures. Table 5 presents the means and standard deviations at pretest and posttest.

Fitness and health body-image variables. It was hypothesized that exercise training would produce significant pre- to posttest increases in self-evaluations of physical fitness and health (MBSRQ Fitness/Health Evaluation). Significant changes were not expected on these variables for the sedentary control group. No specific prediction concerning change over time was made for either condition regarding their

Table 5

Exercise Training and Sedentary Control Group Comparisons on Appearance-Related Body Image: Means, Standard Deviations, and Treatment Effects

	Assessment Time	
Variable/Condition	Pretest	Posttest
MBSRQ Appearance Evaluation		
ET	3.15_a	3.35_b
	(0.81)	(0.78)
SC	3.13_a	3.10_{ab}
	(0.71)	(0.65)
MBSRQ BASS		
ET	3.03_a	3.51_b
	(0.68)	(0.70)
SC	3.00_a	3.00_a
	(0.61)	(0.60)

[Table 5 continued on next page]

Table 5 (continued)

Exercise Training and Sedentary Control Group Comparisons on Appearance-Related Body Image: Means, Standard Deviations, and Treatment Effects

	Assessment Time	
Variable/Condition	Pretest	Posttest
MBSRQ Overweight Preoccupation		
ET	2.87_a	2.40_b
	(0.92)	(1.01)
SC	2.56_a	2.53_{ab}
	(1.01)	(1.03)

Note. Row or column means not sharing a common letter in the subscript are significantly different ($p < .01$).

investment in a physically healthy lifestyle (MBSRQ Fitness/Health Orientation).

The 2 x 2 MANOVA revealed a significant main effect for group, F (2, 83) = 3.88, $p < .03$. The univariate effect was significant only for MBSRQ Fitness/Health Orientation, F (1, 84) = 7.77, $p < .01$. Across pre- and posttest, exercisers were more fitness/health-oriented than sedentary controls, although the difference was significant only at posttest. The main effect of group on Fitness/Health Evaluation was not significant ($p < .07$). The time effect and Group X Time interaction were nonsignificant. Table 6 presents the means and standard deviations on these measures at pretest and posttest.

The result that the exercisers did not show significant improvements in Fitness/Health Evaluation was re-examined in light of the constituent items on this scale. In addition to health evaluation items, it includes "fitness" items that pertain to physical coordination and sports skills. Perhaps such items are unaffected by aerobic exercise training and mask treatment effects. Accordingly, two items that were more face valid regarding a self-evaluation of fitness per se were averaged and analyzed: (1) "I would pass most physical fitness tests," and (2) "My physical endurance is good." The 2 X 2 mixed ANOVA on this measure did produce a significant Group X Time interaction, F (1, 84) = 9.36, $p < .003$. Simple-effects analyses revealed no pre- to

Table 6

Exercise Training and Sedentary Control Group Comparisons on Fitness and Health Body Image: Means, Standard Deviations, and Treatment Effects

Variable/Condition	Pretest	Posttest
MBSRQ Fitness/Health Evaluation		
ET	3.36_a	3.72_a
	(0.61)	(0.63)
SC	3.43_a	3.47_a
	(0.49)	(0.48)
MBSRQ Fitness/Health Orientation		
ET	3.30_{ab}	3.41_b
	(0.65)	(0.52)
SC	3.01_a	3.01_a
	(0.50)	(0.42)

Note. Row or column means not sharing a common letter in the subscript are significantly different ($p < .01$).

to posttest changes among sedentary controls (Ms = 3.10 and 2.95; SDs = .84 and .79, respectively). Exercisers, on the other hand, did show significant gains on this fitness evaluation index from pretest (M = 3.20, SD = .86) to posttest (M = 3.50, SD = .77), F (1,84) = 12.00, p < .001. Moreover, although groups did not differ at pretest, exercisers reported significantly more favorable fitness evaluation at posttest than controls, F (1,84) = 9.60, p < .003.

Results of Analyses of Body-Image State Comparisons

It was predicted that exercise training would lead to significant and progressively positive changes on state body image. Specifically, relative to Time 1 (i.e., pretest), there would be a significant change at Time 2, Time 3 and Time 4. Significant changes were not expected to occur on the state BASS over time for the sedentary control group.

An initial 2 X 4 mixed ANOVA comparing the two exercise training groups revealed no significant main effect for immediate verses delayed assessment, F (1, 55) < 1. Moreover the Group X Time interaction was nonsignificant, F (1, 55) = 2.61. There was only a significant main effect for time, F (3, 165) = 27.54, p < .001. Accordingly, the ET-I and ET-D conditions were collapsed for further analysis to compare ET and SC groups on state body image. The 2 X 4 mixed ANOVA revealed a significant main effect for time, F (3, 252) = 7.85, p < .001. More importantly, the Group X Time interaction was significant, F (3, 252) =

11.68, $p < .001$. Table 7 presents the means, standard deviations, and state body-image comparisons between treatment and control groups for assessment Times 1 through 4.

Simple-effects analysis of the significant interaction examined each group for time effects. Findings revealed that significant changes occurred for the exercise treatment group, $F\ (3, 252) = 28.02$, $p < .001$, but not for the sedentary control group $F\ (3, 252) < 1$. Among exercisers, state body image at Time 2 was not different from Time 1, $F\ (1, 84) = 1.68$. However, when comparing Time 3 to Time 1, a significant difference was revealed, $F\ (1, 84) = 11.32$, $p < .001$. A comparison of state body image at Time 4 versus Time 1 also revealed a significant difference, $F\ (1, 84) = 52.45$, $p < .001$. Simple-effects of groups at each time of assessment further revealed the exercisers' state body image surpassed that of the sedentary controls at Time 3, $F\ (1, 84) = 7.39$, $p < .01$ and at Time 4, $F\ (1, 84) = 12.35$, $p < .001$.

Results for Physiological Fitness Variables

It was hypothesized that exercise training would produce significant pre- to posttest increases on cardiorespiratory fitness measures--namely, decreased recovery heart rates on the Queens college step test. Significant pre- to posttest decreases were also expected on exercisers' measures of body composition from the bio-electrical

Table 7

Exercise Training versus Sedentary Controls on State Body-Image: Means, Standard Deviations, and Treatment Effects

		Assessment Time		
Variable/Condition	Time 1	Time 2	Time 3	Time 4
State BASS				
ET	3.13_a	3.36_a	3.51_b	3.61_b
	(0.66)	(0.67)	(0.63)	(0.69)
SC	3.13_a	3.16_a	3.13_a	3.07_a
	(0.57)	(0.57)	(0.59)	(0.64)

Note. For rows, subscripts that differ indicate significant differences relative to Time 1; for columns different subscripts reflect significant between group differences ($p < .01$).

impedance analysis. Significant changes were not predicted on either measure for the sedentary control group.

The 2 X 2 MANOVA revealed significant main effects for group, F (2, 83) = 35.23, $p < .001$, time, (2, 83) = 20.92, $p < .001$, and their interaction, F (2, 83) = 10.47, $p < .001$. The univariate ANOVAs revealed differential changes over time between the two conditions (i.e., Group X Time interaction) on recovery heart rate, F (1, 84) = 21.18, $p < .001$, but not on body composition ($F < 1$). Whereas the SC subjects were unchanged over time on recovery heart rate, exercisers showed significant improvements ($p < .01$) and remained superior to the SC group at posttest ($p < .01$). Analyses also revealed a significant main effect for time on body composition across both ET and SC groups, F (1, 84) = 15.12, $p < .001$. Unexpectedly, subjects in both groups significantly decreased in their percentage of body fat from pre- to posttest. Table 8 presents the means, standard deviations, and group comparisons at pretest versus posttest.

To provide further clarification of this unexpected finding on body composition, 2 X 2 ANOVAs were conducted on subjects' body mass index (i.e., BMI = kg weight/height in m^2) and their "fat-to-lean" ratio (fat weight/nonfat weight). As shown in Table 8, no significant effects were found on BMI. On the fat-to-lean ratio, however, time and Group X Time

Table 8

Exercise Training and Sedentary Control Group Comparisons on Physiological Fitness: Means, Standard Deviations, and Treatment Effects

Variable/Condition	Pretest	Posttest
Cardiorespiratory Fitness		
ET	168.35_a	147.86_c
	(15.64)	(14.68)
SC	181.52_b	180.00_b
	(20.80)	(12.87)
Body Composition		
ET	27.76_a	26.33_b
	(6.24)	(5.80)
SC	27.44_a	26.15_b
	(7.54)	(6.77)

[Table 8 continued on next page]

Table 8 (continued)

Exercise Training and Sedentary Control Group Comparisons on Physiological Fitness: Means, Standard Deviations, and Treatment Effects

Variable/Condition	Pretest	Posttest
Body Mass Index		
ET	23.1_a	23.2_a
	(3.6)	(3.4)
SC	23.8_a	23.8_a
	(3.9)	(3.9)
"Fat-to-Lean" Ratio		
ET	$.394_a$	$.367_b$
	(.122)	(.113)
SC	$.371_a$	$.365_{ab}$
	(.128)	(.129)

Note. Row or column means not sharing a common letter in the subscript are significantly different ($p < .01$).

effects occurred, $\underline{F}s$ (1, 84) = 10.09 and 4.07, $\underline{p}s < .01$ and .05, respectively. Simple-effects analyses of the interaction indicated a significant pre- to posttest difference for the exercising subjects ($\underline{p} < .001$), but not for sedentary controls. As shown in Table 8, although only the exercisers had lowered fat-to-lean ratios over time, exercisers and controls did not differ on either occasion.

Results for Follow-up Analyses

Attrition rates at follow-up for exercising and nonexercising subjects. Follow-up assessments occurred 9-10 weeks after posttesting. Of the 86 subjects who completed posttesting, 79% of the sedentary group ($\underline{n}$ = 23) and 75% of the exercise group ($\underline{n}$ = 43) returned for the follow-up assessments. A chi-square analysis was conducted to determine if there was a significant differential rate of return for follow-up assessment between the exercisers and the sedentary controls. Results revealed no significant differences between the two groups, X^2 (1) = .161, indicating that approximately the same proportion of participants from each group returned for follow-up assessment.

Initial group integrity at follow-up. An essential factor in analyzing follow-up data was determining the intactness of groups at follow-up. Were exercisers continuing to exercise, and were controls remaining sedentary? Interviews were conducted to determine group integrity between posttesting and follow-up.

Of those subjects who participated in the follow-up assessments, 83% of the control group remained sedentary, and 47% of the exercise group still engaged in regular aerobic exercise. A chi-square analysis was conducted to determine if there was a significant differential group integrity rate between exercisers and nonexercisers. Significant differences occurred, X^2 (1) = 16.51, $p < .01$, showing that at follow-up the sedentary group was clearly and significantly more intact than was the exercise group.

The next set of analyses was conducted to determine any differences between the 20 exercisers who had maintained exercise at follow-up versus the 23 exercisers who had ceased exercise at follow-up. ANOVAs were computed on posttest scores for all MBSRQ and physiological fitness variables to evaluate any differences. As presented in Table 9, results revealed significant differences between groups for two variables: Fitness/Health Orientation, F (1, 41) = 9.47, $p < .01$, and recovery heart rate, F (1, 41) = 8.16, $p < .01$. The exercisers who had maintained exercise at follow-up had, at posttest, a significantly higher investment in their fitness and health and a significantly lower recovery heart rate, compared to those individuals who had ceased exercise at follow-up. Thus, exercise maintainers were more strongly invested in their fitness and health and were more cardiovascularly fit. The same results were found when the 14 exercisers lost to follow-up were also

Table 9

Comparisons between Exercisers who Ceased Exercise (EC) and Exercisers who Maintained Exercise (EM) on Follow-up Variables: Means, Standard Deviations, and F Ratios

Variable/Condition	M (SD)	F Ratio
MBSRQ Appearance Evaluation		< 1
EC	3.37 (0.82)	
EM	3.36 (0.67)	
MBSRQ BASS (trait)		< 1
EC	3.45 (0.76)	
EM	3.54 (0.58)	
MBSRQ Overweight Preoccupation		1.87
EC	2.23 (1.03)	
EM	2.67 (1.05)	
State BASS		< 1
EC	3.59 (0.74)	
EM	3.73 (0.56)	

[Table 9 continued on next page]

Table 9 (continued)

Comparisons between Exercisers who Ceased Exercise (EC) and Exercisers who Maintained Exercise (EM) on Follow-up Variables: Means, Standard Deviations, and F Ratios

Variable/Condition	M (SD)	F Ratio
MBSRQ Fitness/Health Evaluation		< 1
EC	3.68 (0.74)	
EM	3.84 (0.52)	
MBSRQ Fitness/Health Orientation		9.47**
EC	3.22 (0.54)	
EM	3.67 (0.39)	
Recovery Heart Rate		8.16**
EC	151.30 (10.21)	
EM	138.80 (17.94)	

[Table 9 continued on next page]

Table 9 (continued)

Comparisons between Exercisers who Ceased Exercise (EC) and Exercisers who Maintained Exercise (EM) on Follow-up Variables: Means, Standard Deviations, and F Ratios

Variable/Condition	*M* (*SD*)	*F* Ratio
Body Composition		< 1
EC	26.46 (5.29)	
EM	25.46 (5.39)	
Fat/Lean Ratio		< 1
EC	0.37 (0.10)	
EM	0.35 (0.11)	

** $p < .01$

included in the analysis as being among those who had ceased exercise at follow-up: Fitness/Health Orientation, F (1, 55) = 9.21, $p < .01$, and recovery heart rate, F (1, 55) = 14.59, $p < .01$.

Maintenance of Treatment Effects at Follow-up

Because of the above findings of differential attrition between groups at follow-up and systematic differences in continued exercise compliance, simply conducting pretest to follow-up comparisons for exercise versus control subjects would be inappropriate. The most informative, albeit limited, analysis of maintenance of outcomes would concern exercisers who continued to exercise at follow-up. Accordingly, statistical analyses were conducted comparing pretest to follow-up assessment scores among these 20 exercise maintainers.

As shown in Table 10, results of the ANOVAs indicated that all significant exercise treatment gains were maintained at follow-up. An inspection of posttest and follow-up means revealed their comparability, with the exception of recovery heart rate. An F-test confirmed its significant increase from posttest (M = 139) to follow-up (M = 150), F (1, 19) = 8.99, $p < .001$. This latter result is perhaps not surprising, considering subjects were on winter break for 3 weeks between posttesting and follow-up assessment. A frequency count showed that among the exercisers at follow-up, only 35% of these individuals exercised aerobically three times a week or more during the semester

Table 10

Exercise Maintainers' Pretest to Follow-up Scores on All Variables: Means, Standard Deviations, and F Ratios

Variable	Pretest	Follow-up	F Ratio
MBSRQ Appearance Evaluation			12.24**
	2.97	3.30	
	(0.72)	(0.60)	
MBSRQ BASS			19.42**
	3.02	3.54	
	(0.69)	(0.54)	
MBSRQ Overweight Preoccupation			4.53**
	3.09	2.87	
	(0.89)	(0.95)	
MBSRQ Fitness/Health Evaluation			5.57**
	3.66	3.92	
	(0.43)	(0.49)	

[Table 10 continued on next page]

Table 10 (continued)

Exercise Maintainers' Pretest to Follow-up Scores on All Variables: Means, Standard Deviations, and F Ratios

Variable	Pretest	Follow-up	F Ratio
MBSRQ Fitness/Health Orientation			2.68
	3.51	3.66	
	(0.71)	(0.44)	
Recovery Heart Rate			23.52**
	166.00	149.80	
	(15.60)	(19.75)	
Body Composition			4.52**
	27.38	25.58	
	(7.40)	(5.88)	
Fat/Lean Ratio			5.60**
	0.39	0.35	
	(0.14)	(0.12)	

** $p < .01$

break. Thus, a more sedentary life over this period for the majority of subjects probably contributed to their higher recovery heart rate relative to its level immediately following their semester-long exercise training program. Still, their fitness at follow-up surpassed its baseline level.

Predictors of Body-Image Changes among Exercisers

It was predicted for the exercise treatment conditions that there would be a significant negative relationship between appearance/weight management motives for exercise and improvements in state as well as trait body-image satisfaction. The opposite associations were expected for fitness/health management motives for exercise. Table 11 presents the correlations between motives for exercise and changes in state body image (Time 4 - Time 1) and trait body image (posttest - pretest) among the exercisers. Contrary to prediction, correlational analyses were not significant in predicting state and trait body-image changes. Thus, body-image changes could not be predicted from individuals' initial motives for exercise. Table 11 also gives the association between body composition and fitness indices on body-image changes. Again, no significant predictors of body-image change were apparent.

Table 11

Predictors (Correlates) of Changes in State and Trait Body Image among the Exercise Training Groups

Measure	Body-Image State Changes	Body-Image Trait Changes
Reasons for Exercise (at pretest)		
Appearance/Weight Management	-.09	.04
Fitness/Health Management	-.11	.16
Stress/Mood Management	.01	-.08
Socializing	.00	-.08
Composite REI	-.12	.03
Body Weight/Composition		
BMI at Pretest	.10	.03
BMI Change	-.02	-.21
Fat-to-Lean at Pretest	.23	.13
Fat-to-Lean Change	-.08	-.09

[Table 11 continued on next page]

Table 11 (continued)

Predictors (Correlates) of Changes in State and Trait Body Image among Exercise Training Groups

Measure	Body-Image State (BASS)	Body-Image Trait (BASS)
Physiological Fitness		
Recovery heart rate at Pretest	.02	.03
Recovery heart rate Change	.00	.02

Chapter 5

Discussion

This chapter will present the study's primary findings regarding the effectiveness of aerobic exercise in producing state and trait body-image change, in addition to changes in physiological fitness. The study's findings will also be compared to the results of previous exercise and body-image studies. Furthermore, the implications and limitations of the study's findings will be discussed. And finally, suggestions for future exercise and body-image studies will be addressed.

Primary Findings for the Exercise Training and Control Conditions

Given the absence of pretest differences between the exercise training-immediate assessment and the exercise training-delayed assessment groups, these conditions were collapsed for all data analyses with the exception of state body-image comparisons. As predicted, aerobic exercise training was effective in producing positive state and trait body-image changes, unlike the unchanged sedentary control participants. In addition, aerobic exercise significantly improved cardiorespiratory fitness overtime and as compared with the controls. Exercisers significantly decreased their body fat, albeit not differentially as compared to the control subjects. All treatment gains were maintained at the 9-10 week follow-up assessment among those who continued to exercise, despite a partial erosion of cardiorespiratory fitness. The following is a summary and discussion of specific state and trait body-image changes and physiological fitness changes.

Appearance-related body-image changes. It was predicted that women participating in aerobic exercise training would demonstrate significant positive changes on trait appearance-related body-image measures from pre- to posttest, reflecting increases in participants' evaluation of their appearance (MBSRQ Appearance Evaluation), improved satisfaction with specific body areas (MBSRQ BASS), and decreases in overweight concern (MBSRQ Overweight Preoccupation) relative to the sedentary control group.

Indeed, treatment gains were significantly demonstrated on all appearance-related body-image measures from pretest to posttest for the exercisers. Sedentary controls did not change. Nevertheless, between-group differences at posttest reached significance only on the BASS. These findings indicate that the exercisers' attitudes significantly improved regarding their overall appearance in addition to specific areas of their body. Furthermore, these findings reflect a significant decrease in exercisers' overweight concerns--for example, their fat anxiety, reported dieting behaviors, and eating restraint.

While this study's results are consistent with some previous research using aerobic exercise to enhance body-esteem (Ben-Shlomo & Short, 1986; Fisher & Thompson, 1994), they contradict other findings (Davis, 1990a, 1990b; Davis et al., 1990). Similar to the current study's results, Ben-Shlomo and Short (1986) reported improved satisfaction with physical self and self-satisfaction, relative to a control group, as a result of a 6-week aerobic exercise program. These authors claim that physical exercise promotes psychological benefits including improvements in perception of body, health, physical appearance, and sexuality. Likewise, Fisher and Thompson (1994) compared a combined aerobic/anaerobic exercise regimen to group cognitive behavioral therapy (CBT) for treating body-image disturbances among college women. These investigators reported significant improvements for both CBT and exercise therapy regarding affective body-image and self-esteem. Additional positive changes included significant decreases in individuals' eating disturbances and depressive symptoms. Similar to the present study, these improvements were maintained at short-term follow-up. These findings suggest utilizing physical exercise not only to enhance body-satisfaction, but in the treatment of body-image disorders and disturbances (see Cash, 1995; Novy & Cash, 1995).

However, some studies contradict the present study's findings regarding positive appearance-related body-image changes as a result of exercise. Davis (1990a, 1990b; Davis et al., 1990) has asserted that regular aerobic exercise participation is causally related to body-image dissatisfaction and excessive concern with weight and dieting. Davis (1990b) argues, perhaps controversially, that in North America physical fitness has become a social obsession. In one study, Davis (1990b) compared exercising and nonexercising women on addictiveness traits and eating disorder tendencies. She found that addictiveness was positively correlated with weight and dieting variables among the exercisers, but not among the nonexercisers. She concluded that regular participation in exercise fosters extreme body focus and may lead to overweight concern. Similarly, Davis et al. (1990) used a structural equation model and found, among exercising college females, that BMI, emotional reactivity, and physical activity had statistically significant effects on weight and dieting concerns, though weight and dieting concerns did not predict exercise frequency. They concluded that exercise fosters excessive concerns regarding weight and dieting. Davis's findings are in direct opposition to the current study's results indicating that physical exercise led to reduced weight and dieting concerns and to improved feelings of body satisfaction. Nor did the present study indicate a poorer body image or greater weight concerns among those who enrolled in the exercise class, relative to the sedentary controls.

While Davis's studies have intuitive appeal, her findings are at best inconclusive. These studies are correlational research and establish significant relationships in the absence of strong causal inference. While Davis reports that exercise fosters body dissatisfaction and an obsessive attitude towards weight and dieting, the opposite possibility exists; that individuals with body dissatisfaction and an obsessive attitude towards weight and dieting may be prone to exercise. For example, Cash et al., (1994) found that appearance/weight management motives for exercise, reported on the REI, positively correlated with womens' frequency of exercise activity. Furthermore, Novy and Cash (1995) reported that appearance/weight and stress/mood management motives for exercise were the most germane predictors of women's exercise and obligatory exercise behaviors. Thus, as the present study suggests, perhaps participation in an aerobic exercise program could enhance individuals' body esteem and decrease their obsessive attitudes towards weight and dieting. These changes, it was found, were uncorrelated with actual body composition changes. The correlational relationships presently previously should be tested further through experimental procedures.

State body-image change. As predicted, the women who participated in aerobic training showed progressively positive and significant change on state body image over time, compared to the sedentary controls. Additionally, there were no significant differences found as a function of whether state body image was assessed immediately after exercise or a day later. It was thought that perhaps the exercisers who tested immediately after conditioning would show a greater positive effect, compared to the exercisers who tested a day after conditioning. This was expected due to the "euphoric" states that exercise has been found to induce (Carr et al., 1981 ; Farrell et al., 1982), including, positive affective and cognitive appraisals of the training effects during and after the exercise experience (ISSP, 1992; Leith & Taylor, 1991). This reaction by the immediately assessed individuals (ET-I) would be exemplified by progressive positive significant changes in state body-image scores, relative to weaker changes for exercisers with a next-day assessment (ET-D). An alternative proposition, of course, could be that the ET-I group would be reactive to the exercise experience (e.g., mirrored images, limited clothing, body-focus) and make mood-biased assessments resulting in less positive state body-image changes compared to ET-D subjects. For example, Crawford and Ecklund (1994) found that individuals' attitudes regarding the exercise experience were associated with the actual exercise environment. Had this been found in the present study, it could have lent support to Davis's argument that physical exercise can promote negative emotional reactivity regarding body satisfaction among women.

However, results revealed that both exercise training groups demonstrated significantly higher positive scores overtime regarding state body-image, regardless of immediate or delayed assessment after exercise. In addition, standard deviations of scores remained quite constant, indicating little shifting variability among the exercisers' attitudes on a daily basis as a function of timing of assessment. These results indicate that aerobic exercise is effective in the stable improvement of state body image--immediately after exercise and the following day. These improvements emerged about mid-way through the training program and significantly differentiated the exercising women from their sedentary counterparts.

Because the literature is void of studies on exercise and state body image, there are no direct comparisons to be made with this particular aspect of the present study. However, the significant progressive positive change among exercisers regarding state body image, only extends validation to the findings of significant positive trait body-image change among the exercisers in the present study. Furthermore, it supports the hypothesis that physical exercise promotes body satisfaction.

<u>Fitness and health body-image change.</u> It was predicted that women participating in aerobic exercise would produce significant positive pre- to posttest changes regarding self-perceived physical fitness and health (MBSRQ Fitness/Health Evaluation) compared to the sedentary women. No changes were necessarily expected for the exercisers or the sedentary women regarding their investment in a physically healthy lifestyle (MBSRQ Fitness/Health Orientation).

It should be noted that at the commencement of the study, the exercisers were not much more invested in a physically healthy lifestyle than the sedentary subjects. At posttest they were more invested than controls. However, there were no significant changes overtime for either group regarding self-perceptions of personal physical fitness and health. These results are enigmatic, in view of the fact, to be discussed subsequently, that the exercisers significantly improved their cardiorespiratory endurance relative to the sedentary controls, and lowered their body fat over time. One explanation for this finding is that the MBSRQ Fitness/Health Evaluation items were not appropriate for measuring the particular aspects of fitness and health that were evaluated in the present study. Evaluating physical fitness is multidimensional and involves measuring an individual's muscular strength, muscular endurance, flexibility, cardiorespiratory endurance, body composition, and coordination. After re-examining the constituent items on the MBSRQ subscale, a possibility for the discrepancy became evident. While the present study focused on the cardiorespiratory and body composition aspects of physical fitness, the MBSRQ Fitness/Health Evaluation subscale primarily focuses on the skill and coordination aspects of physical fitness. Perhaps the exercisers felt that they significantly improved their cardiorespiratory fitness and body composition, yet did not significantly improve their skill and coordination, resulting in a nonsignificant finding regarding the Fitness/Health Evaluation. In light of this, two face-valid items pertaining to endurance and body composition were averaged and analyzed. These results revealed that the exercisers evaluated their fitness significantly more favorably than the sedentary controls at posttest. Similar to this study's results, Adame and associates (1990) reported a significant positive association between exercise frequency and a more favorable physical fitness self-evaluation on the MBSRQ. The International Society of Sports Psychology (1992) also reported that physical exercise has the capacity to enhance self-perceptions regarding physical capabilities. Finally, Novy and Cash (1995) found that exercise participation was positively related to more favorable fitness evaluations among women and men.

Physiological fitness changes. It was predicted that women participating in aerobic exercise would significantly improve their cardiorespiratory endurance and decease their body fat over time. Indeed, the exercisers did significantly enhance their cardiorespiratory endurance relative to the control condition. At pretest the exercisers' mean recovery heart rate was 168 beats per minute, which placed them at the 45% ranking compared to other college-age women (McArdle et al., 1986). At posttest the exercisers lowered their mean recovery heart rate to 147 which placed them at the 85% ranking. These findings are consistent with other exercise studies in the literature representing the cardiorespiratory benefits from aerobic exercise (Abbott et al., 1989; Ben-Shlomo & Short, 1986; ISSP, 1992; Martinsen et al., 1989a, 1989b; Skrinar et al., 1986; Stein & Motta, 1992). In 1989, Abbott and others found that exercise endurance was significantly and inversely related to resting heart rate among the Framingham study offspring. Stein and Motta (1992) also reported increases among undergraduate college students in cardiovascular fitness following a 7-week aerobic exercise program. Likewise, Ben-Shlomo and Short (1986) reported significant pre- to posttest increases in cardiorespiratory endurance, measured by VO2 max, after participating in a 6-week aerobic exercise training program. Consistent with the present study, most health professionals are optimistic regarding the benefits of aerobic exercise on cardiorespiratory fitness.

Somewhat puzzling results occurred for body composition. Both the exercisers and the sedentaries reduced their body fat over time on the bioimpedance measure. To provide further clarification for this finding, subjects' body mass index and "fat to lean" ratio were also computed and analyzed. While results showed no changes of groups on BMI, the exercisers had a lower fat-to-nonfat ratio from pretest to posttest, however not relative to the controls. Thus, while it is not appropriate to claim that the exercisers reliably reduced their body fat as a result of physical exercise in the present study, many existing research studies confirm such an effect (Abbott et al., 1989; Skrinar et al., 1986; Tremblay et al., 1991). Skrinar and others (1986) compared body composition between exercisers and nonexercisers before and after an intensive 8-week aerobic running program and found that, relative to the nonexercisers, the exercisers significantly decreased their body fat as measured by hydrostatic weighing. Similarly, Tremblay et al., (1991) found aerobic exercise effective in treating obesity. Abbott and collaborators (1989) found an inverse relationship between exercise endurance and body mass index when analyzing Framingham study data.

It is unclear why the sedentary controls may have reduced their body fat in the present study. One possibility for this finding may be because nutritional intake was not controlled. Body fat can be reduced by decreasing fat-intake in the diet, or by increasing aerobic activity. While aerobic activity was increased for the exercise training group, nutritional fat-intake could have been reduced for the controls, therefore resulting in a significant body composition alteration.

Maintenance of treatment outcomes. Attrition is a well-known problem in physical exercise research (Epstein, Wing, Thompson, & Griffin, 1980; Fisher & Thompson, 1992; Martin et al., 1984). Although retention of participants to posttest was excellent in this study, attrition did produce some difficulties for the follow-up assessment 9 to 10 weeks later. Exercisers and controls were equally likely to return for follow-up, at a mean retention rate of 77%. However, among the returning controls, 83% remained sedentary, whereas only 47% of the returning exercise participants continued regular aerobic activity. A comparison of those women who maintained versus those discontinued exercise indicated that the latter had been less invested in their fitness and health and less cardiovascularly fit at posttest. No body-image differences existed between the two groups however.

Because of these differential attrition and exercise maintenance problems, group-comparative outcomes at follow-up would be inconclusive. A conservative approach was taken to determine simply whether those who continued to exercise continued to manifest the improvements that had been evident at posttest. Indeed, these women showed sustained improvements on body image and fitness relative to their pre-program levels.

Correlations between motives for exercise and changes in state and trait body image among exercisers. It was predicted that, for the exercising women, there would be a significant negative relationship between appearance/weight management motives for exercise, and state as well as trait body-image satisfaction. The opposite association was expected for fitness/health exercise motives. Unexpectedly, neither state nor trait body-image changes could be predicted based upon the reasons that individuals gave for exercising.

These findings seem inconsistent with other recent research analyzing exercise motivation and body-image relationships (Cash et al., 1994; Novy & Cash, 1995). More specifically, appearance/weight management motives for exercise predict more negative body-image experiences among women (Cash et al., 1994) as well as men (Novy & Cash, 1995). Apparently, such motivation does not preclude one's reaping body-image gains from regular aerobic activity.

Implications and Limitations of the Study

Expanding the body-image and exercise research literature, the findings of the this study demonstrate the effectiveness of a 13-week aerobic exercise program in improving body image and physical fitness among urban college women. Given the prevalence of higher stress levels due to environmental conditions among those residing in urban environments, the knowledge that physical exercise can positively enhance mood state, overall body-esteem, and improve physical fitness is valuable information. These implications suggest the need for recreation and fitness professionals to continue to provide accessible exercise opportunities for urban dwellers, in hopes to reduce stress, improve overall psychological and physical health, and provide safe and effective outlets for recreation and leisure.

This study's unique contributions to the literature reside in the finding that not only was aerobic exercise effective in positively altering trait body image, but exercise improved state body image as well. The state body-image data resulting from this investigation includes particularly extraordinary information, because evidence regarding the effects of exercise on state body image is absent from the scientific literature.

This study's conclusion that aerobic exercise can effectively improve state and trait body image among urban women also has implications for the community at large. The prevalence of body dissatisfaction among the general population is on the rise (Cash & Henry, in press; Cash et al., 1986; Cash & Pruzinsky, 1990). Given the prevalence of negative body image, particularly among women, many individuals would benefit from an increased activity level to alleviate some of the dysphoria associated with body dissatisfaction. Additionally, in light of the strong association between negative body image and other psychological disorders, exercise may be prescribed by clinicians as an adjunct to other psychological treatments.

This study's finding that aerobic exercise improves cardiorespiratory health, in addition to lowering body fat also has significant health implications consistent with previous literature. Aerobic exercise aids in reducing the risk of coronary heart disease by lowering resting heart rate and storage fat, and increasing high density lipoprotein cholesterol (Burke et al., 1991; Lee et al., 1991; Wilson, 1990). In addition, physical activity is a valuable adjunct to controlling and treating obesity. The present research as well as existing literature support the health implications for urban communities and the general public--that physical exercise is an essential component in developing and maintaining physiological health.

In addition to the implications of the currents study's results, there are several limitations that should be addressed. While random assignment was conducted for the ET-I and ET-D exercise treatment groups, overall the present study was a quasi-experimental design. A quasi-experimental design lacks the control provided by random assignment of subjects in true experimental designs. The effectiveness of quasi-experimental studies in providing internal validity rests on the assumption that experimental and control groups are suitably matched. Comparisons did reveal that groups were comparable at pretest on age, body composition, and all body-image measures. Sedentary controls were, however, less physically fit in terms of their higher recovery heart rates following the step test. While it would be optimal for future research to randomly assign sedentary individuals to either an exercise treatment group or a control group, this is often practically difficult and can be ethically questionable.

Although follow-up analysis was successful in retaining subjects for testing (approximately 80%), many subjects failed to maintain their exercise/nonexercise group of origin. More specifically, a large percentage of exercisers had not continued in an aerobic exercise program at follow-up, and a smaller percentage of sedentaries had begun an exercise program. Apparently too, although discontinuing exercisers were more comparable to continuing exercisers on posttest body image and body composition, the former were less physically fit and less invested in health and fitness. These problems precluded a complete statistical analysis of follow-up data. Nevertheless, a limited analysis did confirm that women who continued aerobic activity maintained their treatment gains on both fitness and body image. More controlled follow-up procedures should be conducted in future studies in order to make clearer inferences regarding maintenance of treatment effects.

Although the study's results demonstrate the effectiveness of aerobic exercise in positively altering cardiorespiratory fitness and body composition, the fitness measurers utilized in the present study are not without criticism. The ideal assessment of cardiorespiratory fitness would have been the direct measurement of VO2 max (McArdle et al., 1972, 1986, 1991). This procedure requires a laboratory and specialized equipment, as well as extensive effort by the subjects. Consequently, this test was not utilized for the large number of untrained subjects in the present study. Hydrostatic weighing is the "gold standard" for assessing body composition (McArdle et al., 1986, 1991). Likewise, this procedure is extremely time consuming and requires laboratory facilities and highly trained testers. Due to the primary nature of the study being a focus on body image, simpler indices of body composition were used.

Suggested Directions for Future Research

There are many important topics to address regarding future research on body image and exercise. The results of the present study demonstrate the effectiveness of exercise training on state and trait body image, in addition to cardiorespiratory endurance and body composition. One logical extension from this study would be to analyze the effects of aerobic exercise in not only enhancing body esteem but in overcoming more severe body-image disturbances and disorders in a clinical or nonclinical environment. Of course, the efficacy of exercise among those who also have eating disorders is complicated by their maladaptive and compensatory use of exercise to manage body-image and weight-gain anxieties (Rosen, 1990; Yates, 1991). Through experimental procedures the effects of exercise on body-image disturbances among those without eating disorders could be analyzed solely (Fisher & Thompson, 1994), or as an adjunct to therapy. More specifically, it would be useful to compare the effects of three treatments on body image: (1) psychological therapy (particularly cognitive-behavioral body-image therapy; see Cash, 1995; Grant & Cash, 1995), (2) aerobic exercise, and (3) therapy plus aerobic exercise. If therapy and exercise could be integrated to form a more effective approach to treating body-image disturbances, this would be of considerable value to participants.

While research has focused on women's body-image disturbances and disorders, it appears as though men are becoming increasingly dissatisfied with their appearance as well (Cash & Pruzinsky, 1990). In a national survey administered in 1985 (Cash et al., 1986) results revealed that 41% of male respondents expressed weight dissatisfaction; while in a similar 1972 study only 35% of the male respondents expressed body-discontent. Currently the muscular, mesomorphic body-type represents the standard for male physical attractiveness, although this is a somatotype only achieved through strenuous exercise. Future body-image research should examine the role exercise plays in contributing to body image among men (Davis, et al., 1991; Novy & Cash, 1995).

Body image and exercise follow-up studies to date have been problematic due to lack of compliance to exercise programs (Epstein et al., 1980; Fisher & Thompson, 1994; Martin et al., 1984). To date, due to attrition problems, follow-up findings offer very tentative support regarding maintenance of exercise treatment effects. Clearly, it is important for future research to employ more controlled, longer-term follow-up studies in exercise and body-image research to establish the durability of treatment effects.

Little research has focused on the effects of exercise on body image among disabled populations. When an individual acquires a disability, many professionals focus on what limitations the individual will face or how the individual will react to the limitations (Cash & Pruzinsky, 1990). Physical exercise clearly has the potential to enhance physical strength and endurance among physically disabled individuals, shifting the focus to physical abilities as opposed to limitations. Future exercise studies should incorporate attitudinal measures regarding body image and self-esteem among disabled individuals. Similarly, other populations undergoing body changes (i.e., the elderly, or pregnant or post-menopausal women) could potentially benefit from the effects of exercise on body image as well. While most health professionals encourage exercise for physiological reasons among special populations, little research exists regarding the effects of exercise on mental health for these populations. The extent to which exercise positively alters body image for these individuals is important to consider in future research. Given the proven effectiveness of physical exercise to enhance mental and physical health, it is hoped that other researchers will explore some of these avenues for future study outlined here. The results of the present study offer optimism that regular exercise can enhance mental and physical health among people who are willing to participate.

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Appendix A

Informed Consent

This is to certify that I understand and agree to voluntarily participate in the body-image scientific research study at Old Dominion University conducted by Ms. Sherri Hensley under the direction of Dr. Stephen Greiner, Associate Dean of Education.

I understand that the participation in the program involves regular attendance of an aerobic dance class over 15 weeks (occurring in the fall semester of 1993) and completion of various questionnaires and physiological assessments (fall 1993 and early spring semester 1994).

I understand that some of the items on the questionnaires ask about personal matters. A code number rather than my name will be associated with my responses, to ensure confidentiality.

I acknowledge that I was informed about any possible risks to my health and well-being that might be related to my participation in the program. I understand that in the event of illness or injury resulting from any of the procedures conducted throughout the course of the study, emergency medical care and/or hospitalization will not be provided free of charge nor will financial compensation be available.

I understand that I am free to end my participation at any time, without penalty or fear of prejudice. I have been given the opportunity to ask any questions and all such questions have been answered to my satisfaction.

I understand that I may contact Dr. Stephen Greiner (683-4686) and/or the Education Department Committee for the protection of Human Subjects should I wish to express any opinions regarding the conduct of the research study.

Signature: ______________________________ Date: ________________

Date of Birth: ___________________________

Informed Consent

This is to certify that I understand and agree to voluntarily participate in the body-image scientific research study at Old Dominion University conducted by Ms. Sherri Hensley under the direction of Dr. Stephen Greiner, Associate Dean of Education.

I understand that participation in this program requires that I complete various questionnaires and physiological assessments during the 1993 fall semester.

I understand that some of the items on the questionnaires ask about personal matters. A code number rather than my name will be associated with my responses, to ensure confidentiality.

I acknowledge that I was informed about any possible risks to my health and well-being that might be related to my participation in the program. I understand that in the event of illness or injury resulting from any of the procedures conducted throughout the course of the study, emergency medical care and/or hospitalization will not be provided free of charge nor will financial compensation be available.

I understand that I am free to end my participation at any time, without penalty or fear of prejudice. I have been given the opportunity to ask any questions and all such questions have been answered to my satisfaction.

I understand that after completion of the questionnaires and physical assessments in December 1993, I will receive two research credits.

I understand that I may contact Dr. Stephen Greiner (683-4686) and/or the Education Department Committee for the protection of Human Subjects should I wish to express any opinions regarding the conduct of the research study.

Signature: ______________________________ Date: ________________

Date of Birth: ____________________________

Appendix B

Demographic Data Sheet

Please Complete the following items. The answers you give are anonymous, so please do not write your name on this.

Respondent Code Number
(enter last 4 digits of Social Security Number) ________

Gender ______
Age ______
Race/Ethnic Status ______Black ______White ______Asian
______Hispanic ______Native American ______Other

Years of college completed ______

Do you have a diagnosed physical illness (such as orthopedic, cardiopulmonary, or neurological disorder)? ______ yes ______ no

If yes, please describe ____

Are you taking prescribed medications? ______ yes ______ no

If yes, please describe ____

Are you currently pregnant? ______ yes ______ no

Current height (without shoes) ______ feet ______ inches

Current weight (in light clothing) ______ pounds

Are you currently exercising aerobically a minimum of 3 times a week?
______ yes ______ no

If yes, please describe ____

____

Appendix C

THE MBSRQ

INSTRUCTIONS--PLEASE READ CAREFULLY

The following pages contain a series of statements about how people might think, feel, or behave. You are asked to indicate the extent to which each statement pertains to you personally.

Your answers to the items in the questionnaire are anonymous, so please do not write your name on any of the materials. In order to complete the questionnaire, read each statement carefully and decide how much it pertains to you personally. Using a scale like the one below, indicate your answer by entering it to the left of the number of the statement.

1	2	3	4	5
Definitely Disagree	**Mostly Disagree**	**Neither Agree Nor Disagree**	**Mostly Agree**	**Definitely Agree**

EXAMPLE:

______ I am usually in a good mood.

In the blank space, enter a **1** if you definitely disagree with the statement; a **2** if you mostly disagree; a **3** if you neither agree nor disagree; a **4** if you mostly agree; or enter a **5** if you definitely agree with the statement.

There are no right or wrong answers. Just give the answer that is most accurate for you. Remember, your responses are anonymous, so please be completely honest and answer all items.

1	2	3	4	5
Definitely Disagree	**Mostly Disagree**	**Neither Agree Nor Disagree**	**Mostly Agree**	**Definitely Agree**

______ 1. Before going out in public, I always notice how I look.

______ 2. I am careful to buy clothes that will make me look my best.

______ 3. I would pass most physical-fitness tests.

______ 4. It is important that I have superior physical strength.

______ 5. My body is sexually appealing.

______ 6. I am not involved in a regular exercise program.

______ 7. I am in control of my health.

______ 8. I know a lot about things that affect my physical health.

______ 9. I have deliberately developed a healthy life-style.

______ 10. I constantly worry about being or becoming fat.

______ 11. I like my looks just the way they are.

______ 12. I check my appearance in a mirror whenever I can.

______ 13. Before going out, I usually spend a lot of time getting ready.

______ 14. My physical endurance is good.

______ 15. Participating in sports is unimportant to me.

______ 16. I do not actively do things to keep physically fit.

______ 17. My health is a matter of unexpected ups and downs.

______ 18. Good health is one of the most important things in my life.

______ 19. I don't do anything that I know might threaten my health.

______ 20. I am very conscious of even small changes in my weight.

1	2	3	4	5
Definitely Disagree	**Mostly Disagree**	**Neither Agree Nor Disagree**	**Mostly Agree**	**Definitely Agree**

_______ 21. Most people would consider me good-looking.

_______ 22. It is important that I always look good.

_______ 23. I use very few grooming products.

_______ 24. I easily learn physical skills.

_______ 25. Being physically fit is not a strong priority in my life.

_______ 26. I do things to increase my physical strength.

_______ 27. I am seldom physically ill.

_______ 28. I take my health for granted.

_______ 29. I often read books and magazines that pertain to health.

_______ 30. I like the way I look without my clothes on.

_______ 31. I am self-conscious if my grooming isn't right.

_______ 32. I usually wear whatever is handy without caring how it looks.

_______ 33. I do poorly in physical sports or games.

_______ 34. I seldom think about my athletic skills.

_______ 35. I work to improve my physical stamina.

_______ 36. From day to day, I never know how my body will feel.

_______ 37. If I am sick, I don't pay much attention to my symptoms.

_______ 38. I make no special effort to eat a balanced and nutritious diet.

_______ 39. I like the way my clothes fit me.

_______ 40. I don't care what people think about my appearance.

1	2	3	4	5
Definitely Disagree	**Mostly Disagree**	**Neither Agree Nor Disagree**	**Mostly Agree**	**Definitely Agree**

_______ 41. I take special care with my hair grooming.

_______ 42. I dislike my physique.

_______ 43. I don't care to improve my abilities in physical activities.

_______ 44. I try to be physically active.

_______ 45. I often feel vulnerable to sickness.

_______ 46. I pay close attention to my body for any signs of illness.

_______ 47. If I'm coming down with a cold or flu, I just ignore it and go on as usual.

_______ 48. I am physically unattractive.

_______ 49. I never think about my appearance.

_______ 50. I am always trying to improve my physical appearance.

_______ 51. I am very well coordinated.

_______ 52. I know a lot about physical fitness.

_______ 53. I play a sport regularly throughout the year.

_______ 54. I am a physically healthy person.

_______ 55. I am very aware of small changes in my physical health.

_______ 56. At the first sign of illness, I seek medical advice.

_______ 57. I am on a weight-loss diet.

For the remainder of the items use the response scale given with the item, and enter your answer in the space beside the item.

(continued on the next page)

(continued on the next page)

______ 58. I have tried to lose weight by fasting or going on crash diets.

1. Never
2. Rarely
3. Sometimes
4. Often
5. Very Often

______ 59. I think I am:

1. Very Underweight
2. Somewhat Underweight
3. Normal Weight
4. Somewhat Overweight
5. Very Overweight

______ 60. From looking at me, most other people would think I am:

1. Very Underweight
2. Somewhat Underweight
3. Normal Weight
4. Somewhat Overweight
5. Very Overweight

61-69. Use this 1 to 5 scale to indicate how satisfied you are with each of the following areas or aspects of your body:

1	2	3	4	5
Very Dissatisfied	**Mostly Dissatisfied**	**Neither Satisfied Nor Dissatisfied**	**Mostly Satisfied**	**Very Satisfied**

______ 61. Face (facial features, complexion)

______ 62. Hair (color, thickness, texture)

______ 63. Lower torso (buttocks, hips, thighs, legs)

______ 64. Mid torso (waist, stomach)

______ 65. Upper torso (chest or breasts, shoulders, arms)

______ 66. Muscle tone

______ 67. Weight

_______ 68. Height

_______ 69. Overall appearance

The Reasons for Exercise Inventory

People exercise for a variety of reasons. When people are asked why they exercise, their answers are sometimes based on the reasons they believe they should have for exercising. What we want to know are the reasons people actually have for exercising. Please respond to the items below as honestly as possible. To what extent is each of the following an important reason that you have for exercising? Use the scale below, ranging from 1 to 7, in giving your answers. (If you never exercise, please skip this section.)

1	2	3	4	5	6	7
Not At All Important			Moderately Important			Extremely Important

_______ 1. To be slim

_______ 2. To improve my muscle tone

_______ 3. To cope with sadness, depression

_______ 4. To improve my cardiovascular fitness

_______ 5. To improve my appearance

_______ 6. To meet new people

_______ 7. To redistribute my weight

_______ 8. To lose weight

_______ 9. To improve my strength

_______ 10. To cope with stress, anxiety

_______ 11. To improve my overall health

_______ 12. To be sexually desirable

_______ 13. To socialize with friends

_______ 14. To improve my overall body shape

_______ 15. To maintain my current weight

_______ 16. To improve my endurance, stamina

______ 17. To increase my energy level

1	2	3	4	5	6	7
Not At All Important			Moderately Important			Extremely Important

______ 18. To increase my resistance to illness and disease

______ 19. To be attractive to members of the opposite sex

______ 20. To have fun

______ 21. To alter a specific area of my body

______ 22. To improve my flexibility, coordination

______ 23. To improve my mood

______ 24. To maintain my physical well-being

______ 25. To do what is socially expected

INSTRUCTIONS--PLEASE READ CAREFULLY

Your answers on this questionnaire are anonymous, so please do not write your name on it. Using the scale below, ranging from A to E, indicate your answer on the line provided to the left of the numbered item. Please respond as honestly as possible.

Respondent Code Number
(last 4 digits of Social Security Number) ____________

Date ____________ Time of day ____________

1-9. Indicate how satisfied you are with each of the following areas of your body RIGHT NOW, AT THIS MOMENT.

A	B	C	D	E
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Very Satisfied

_____ 1. Face (facial features, complexion)

_____ 2. Hair (color, thickness, texture)

_____ 3. Lower torso (buttocks, hips, thighs, legs)

_____ 4. Mid torso (waist, stomach)

_____ 5. Upper torso (chest or breasts, shoulders, arms)

_____ 6. Muscle tone

_____ 7. Weight

_____ 8. Height

_____ 9. Overall appearance

Appendix D

BIO-IMPEDANCE DATA SHEET

Subject Code number
(last 4 digits of Social Security number) ____________

Date ____________

Age ____________

Height (in inches) ____________

Weight ____________ lbs.

Res ____________

Rea ____________

Imp ____________

Pha A ____________

Lean lbs. ____________

Fat lbs. ____________

Fat % ____________

CARDIORESPIRATORY DATA SHEET

Subject code number
(last 4 digits of Social Security number) ____________

Resting heart rate ____________

Converted ____________ per minute

Recovery heart rate ____________

Converted ____________

Percentile ranking ____________

Predicted VO2 max ____________

Appendix E

Exercise Interview Questions

1) Did you engage in physical exercise regularly (2-3 times a week) over the winter break?

If yes, what type, how often, and for how long?

2) Are you currently exercising on a regular basis?

If yes, what type, how often, and for how long?

Follow-up Participation Sheet

Please indicate whether or not you would be willing to participate in a follow-up testing session in February 1994. This session would involve testing similar to that which you participated in this semester. It will take approximately 20 minutes, and will be scheduled at a time that is convenient for you.

During this testing session you would also receive pretest and posttest information regarding your body composition (body fat) and cardiovascular fitness level which was determined before and after your aerobic participation this fall semester, 1993.

______ yes, I am willing to participate

______ no, I am not willing to participate

If yes, please print your full name and phone number clearly where you can be reached in January 1994.