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THE EFFECT OF AEROBIC AND AEROBIC/STRENGTH TRAINING ON BODY IMAGE IN FEMALES

Ruth Nance Henry

A dissertation presented to the
Graduate Faculty of Middle Tennessee State University
in partial fulfillment of the requirements
for the degree Doctor of Arts

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THE EFFECT OF AEROBIC AND AEROBIC/STRENGTH TRAINING

ON BODY IMAGE IN FEMALES

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ABSTRACT

THE EFFECT OF AEROBIC AND AEROBIC/STRENGTH TRAINING

ON BODY IMAGE IN FEMALES

by

Ruth Nance Henry

The purpose of this study was to determine the effect of aerobic and aerobic/strength training on body image in females. Seventy-two college-aged females volunteered for this study. Before the training programs began, all subjects completed testing for percent body fat, cardiovascular endurance, upper body strength/endurance, and nine body image components assessed by the Body Self-Image Questionnaire (Rowe, 1996). After the pretests, 23 subjects completed 12 weeks of aerobic exercise training, and 28 subjects completed 12 weeks of aerobic/strength training. The remaining 21 subjects did not change their current exercise regimen, and did not participate in vigorous exercise training. After the 12-week training programs, the researchers retested all subjects, using procedures identical to those used during pretest. Analysis of covariance (ANCOVA) was performed on each physical fitness variable and each component of body image in order to detect differences among groups. ANCOVA results indicated a significant difference ($p<.05$) among the three groups in overall appearance evaluation ($p=.036$), fatness evaluation ($p=.028$), attention to grooming ($p=.038$), health/fitness evaluation ($p=.026$), height dissatisfaction ($p=.029$), negative affect ($p=.016$), and all fitness variables. No significant differences occurred among groups in health/fitness influence,

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social dependence, or investment in societal ideals. Tukey/Kramer post hoc tests determined pairwise differences ($p<.05$) between groups where significant differences in the overall ANCOVA were found. Aerobics/strength training subjects had higher VO_2 max than the control group, and had greater upper body strength than both the aerobics group and the control group. Aerobics/strength training subjects had lower percent body fat than both aerobics and control group subjects, and aerobics group subjects had lower percent fat than control group subjects. In the body image variables, pairwise comparisons indicated significantly more positive attitudes in aerobics/strength training subjects than control subjects in overall appearance evaluation, fatness evaluation, attention to grooming, and negative self-affect. In health/fitness evaluation and height dissatisfaction, the aerobics/strength training group exhibited more positive attitudes than the aerobics group. In conclusion, females who participate in a combination of aerobic and strength training have more positive body image profiles than nonexercisers.

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CHAPTER 1

INTRODUCTION

Disturbances in body image are a serious concern in the current culture. Because of their contribution toward the development of eating disorders such as anorexia nervosa and bulimia nervosa, research concerning body image has been abundant in recent years. Although many researchers have shown interest in this area, there has been little consensus of opinion about how to measure body image; indeed, even the definition of "body image" has been controversial.

The classic definition, proposed by Schilder (1950, p. 11), is "the picture of our body which we form in our mind, that is to say the way in which the body appears to ourselves." This definition, while widely used, does not address the problem of whether the picture we form of our body bears any resemblance to our actual body. Yet, many researchers (Traub and Orback, 1964; Gardner, Martinez, and Sandoval, 1987; Reitman and Cleveland, 1964) have used the term "body image" to refer to the correctness of self body size perception. In some cases size perception is inaccurate; however, many individuals with body image disturbances perceive their bodies quite correctly, yet they are highly dissatisfied with that perception.

Thus, it appears that "body image," as the term is commonly used, can refer to either the accuracy or inaccuracy of the perception of bodily size, or to the thoughts and feelings associated with the individual's view of the body. This establishes that the body

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image construct is multidimensional in nature, and is comprised of two relatively independent components–perception (size estimation), and attitudes (body-related affects and cognitions) (Cash, 1989). Within those two main components, there exist many subcomponents which are also relatively independent of each other (Cash, 1994; Rowe, 1996). While the earliest research concerned the perceptual component of body image, more recent research has focused on the assessment and treatment of disturbances relating to the attitudes toward one's body (Thompson, 1995).

The construct of body image was first established by theorists, beginning in the first half of the 20th century. Schilder (1950), whose writings prior to 1950 were published in German, based his theories upon his own philosophical reasoning and clinical observations accumulated during psychoanalysis. He was the first theorist to show interest in body image disturbances in normal individuals; most of the interest prior to that time had focused upon those with eating disorders. In his writings, Schilder went into detail describing the backgrounds and personalities of his patients, relating some of the personality attributes to disturbances in body image.

Shontz (1969) designated "body schemata" and "body image" as the two major components of body cognitions, with body schemata involving the perception of the body, and body image involving the cognitive-affective aspect. The body schemata is objective in nature, while body image is more subjective. In keeping with the designations of Shontz, most researchers now refer to the subjective indices, that is, thoughts, feelings, and attitudes regarding the body when they use the term "body image." The attitudinal component of body image is addressed in this research.

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Fisher (1986) espoused the idea that body image influences behavior, including sexual arousal patterns, drug addiction, delinquent behavior, and several other negative behaviors. He identified 14 different aspects of body image which he considered to be relatively independent of each other.

In more recent years, Thompson (1995) advocated the critical role of body image in the onset and maintenance of eating disorders and obesity. The book which he edited (1995) is probably the most comprehensive compilation in this decade addressing the theory of body image and its effect on both normal individuals, obese individuals, and those with eating disorders.

While the development of body image disturbances has been attributed to many factors, most researchers appear to agree that the strongest influences are sociocultural (Heinberg, 1995). Females feel pressured, in part through mass media, to achieve a near-impossible degree of thinness, and to avoid any form of obesity (Striegel-Moore, McAvay, and Rodin, 1986). These pressures have led to increasing dissatisfaction with our bodies, to the extent that Rodin, Silberstein, and Striegel-Moore (1985) referred to a "normative discontent," with dissatisfaction with one's own body becoming the societal norm. Other factors named in the development of body disturbances are actual body size (Penner, Thompson, and Coovert, 1991), early physical maturation (Fabian and Thompson, 1989), teasing or negative comments from other people (Brown, Cash, and Lewis, 1989), and a history of sexual victimization (Billingham and Patterson, 1998).

Body image disturbances cause other difficulties, with the difficulty mentioned most often being a destructive influence on self-esteem. Wylie (1974) suggests that "It

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seems intuitively obvious that attitudes toward the body are important aspects of self-regard" (p. 240). Reduced self-esteem is often accompanied by depression (Salem and Elovson, 1993) in those with negative body image, as well as modified sexual self-schema. The most alarming by-product of negative body image is the increased risk of eating disorders (Thompson, 1995), because not only the mental health is affected, but the risk of a deleterious effect on physical health, including premature death, exists.

A wide assortment of instruments have been proposed to measure body image, ranging from the very simple to the technical and complex. To assess body size accuracy, researchers have used mirrors, photographs, and videos which distort the whole body or specific body parts (Traub and Orback, 1964; Glucksman and Hirsch, 1969; Freeman, Thomas, Solyom, and Hunter, 1984), as well as body calipers and moveable light beams (Reitman and Cleveland, 1964; Slade and Russell, 1973; Ruff and Barrios, 1986).

The cognitive/affective component of body image was first measured by silhouette, with the subject choosing his or her own perceived body type from a series of silhouettes arranged incrementally from very thin to very obese. (Stunkard, Sorensen, and Schulsinger, 1983; Fallon and Rozin, 1985; Goldberg, Lenart, Bailey, and Koff, 1996). The questionnaire is by far the most common instrument in the measurement of thoughts and feelings regarding the body. Most of the current questionnaires are multidimensional in nature; that is, they purport to measure several independent facets of body cognition/affect (Secord and Jourard, 1953; Franzoi and Shields, 1984; Cooper, Taylor, Cooper, and Fairburn, 1987; Brown, Cash, and Milkulka, 1990; Cash and Szymanski, 1995; Rowe, 1996). While these facets are defined differently by each researcher,

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similarities in those aspects described in the different questionnaires do exist.

A considerable controversy has existed regarding the optimal method of measuring either the perceptual or the cognitive/affective aspect of body image. In 1969, Shontz stated, "Unfortunately, it cannot be said that body-image theorists as a group have yet succeeded in building very strong cases for the measures they have proposed" (Shontz, 1969, p. 173). An examination of the literature supports this belief. Even today, this statement from Shontz appears to be true.

Treatment of body image has mostly consisted of cognitive-behavioral therapy (Cash, 1995) and may be in the form of group, individual, or self-directed therapy. The role of exercise in the treatment of body image disturbances has recently come to the attention of researchers (Finkenberg, DiNucci, McCune, and McCune, 1993; Tucker, 1987; Ford, Puckett, Reeve, and Lafavi, 1991; Holmes, Chamberlin, and Young, 1994), although well-controlled, experimental research is still not abundant. Additionally, there is not a consensus of opinion as to which type of exercise could be most beneficial in improving body image. The intent of the research presented in this report was to provide some insight into this issue, with the possibility of providing further evidence that exercise can improve body image. Although males and females both have difficulties with body image, there are distinct differences in the issues facing males and females. Therefore, for the sake of simplicity, the present study was limited to females.

The present experiment examined the differences in body image parameters which occur after aerobic training or after a combination of aerobic/strength training. Because the degree of effort in individual workouts in the weight room is difficult to monitor

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accurately, this study was designed to use muscular strength/endurance training in a class setting, with subjects performing a circuit of different free-weight exercises, rather than the traditional resistance training approach conducted in a weight room.

Purpose

The purpose of this study was to determine the effects of different types of exercise training on body image in college-aged females.

Hypotheses

During this study, the following hypotheses were addressed:

1. Individuals participating in a combination aerobic and strength training program exhibit a more favorable self appearance evaluation than individuals participating in aerobic training or nonexercisers.

2. Individuals participating in a combination aerobic and strength training program exhibit a more favorable self fatness evaluation than individuals participating in aerobic training or nonexercisers.

3. There is no difference in attention to grooming among individuals who do not exercise, individuals who participate in aerobic/strength training, and individuals who participate in aerobic training.

4. Individuals participating in a combination aerobic and strength training program exhibit a more favorable self health/fitness evaluation than individuals participating in aerobic training or nonexercisers.

5. Individuals participating in a combination aerobic and strength training

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program place more importance on health/fitness than individuals participating in aerobic training or nonexercisers.

6. Individuals participating in a combination aerobic and strength training program exhibit less social dependence in terms of comparing others' bodies to their own than individuals participating in aerobic training or nonexercisers.

7. There is no difference in height dissatisfaction among individuals who do not exercise, individuals who participate in aerobic/strength training, and individuals who participate in aerobic training.

8. Individuals participating in a combination aerobic and strength training program exhibit less negative self-affect concerning their bodies than individuals participating in aerobic training or nonexercisers.

9. There is no difference in investment in ideals concerning body image among individuals who do not exercise, individuals who participate in aerobic/strength training, and individuals who participate in aerobic training.

These nine hypotheses represent the nine subscales of body image on the Body Self-Image Questionnaire (Rowe, 1996). Chapter 3 includes the definitions of all components of body image.

Experimental Design

This research was an experimental pretest-posttest design comparing differences in both body image and physical fitness parameters among subjects participating in an aerobic training program, subjects participating in a combination program of aerobic and strength training, and control subjects who did not engage in vigorous exercise during the

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12 weeks. Subjects were tested for physical fitness and body image cognitions and attitudes before and after a 12-week, 3-times-per-week training program.

Delimitations

This study addressed the effects of different types of exercise on non-eating-disordered young women. The findings of this research are not expected to generalize to males, females over 30 years of age, or young females who have been diagnosed with eating disorders.

The subjects in this study were not placed randomly into the different exercise groups; rather, they were assigned according to individual schedule limitations. Because of this, accurate interpretation of the results may be compromised.

Definitions

Body Image–the feelings, thoughts, and satisfaction associated with the perception of one's physical body.

Size Perception Accuracy–the degree to which a person can evaluate self body size accurately, measured as the difference between actual body size and perceived body size.

Aerobic Exercise–exercise which is primarily aerobic in nature; the dominant purpose of such exercise is to challenge the cardiovascular system to increase cardiorespiratory endurance. To achieve this, the individual attains an exercise heart rate between 60% and 90% of her age–predicted maximum (220 beats per minute - age in years).

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Aerobic/Strength Exercise–exercise which is a combination of aerobic exercise and strength training. The dual emphasis includes exercise to challenge the cardiovascular system to increase cardiorespiratory endurance, as well as muscular endurance exercises sufficient to fatigue the major muscle groups.

Body Composition–the percentage of fat-free tissue and fat tissue in total body mass.

Cardiorespiratory Endurance–the ability of the cardiovascular system to endure the overload imposed by aerobic exercise over an extended period of time.

VO_2 max–the maximum volume of oxygen that a subject can consume during exercise, expressed in milliliters of oxygen per kilogram of body weight per minute ($ml \cdot kg^{-1} \cdot min^{-1}$).

BMI - body mass index, defined as weight (in kilograms) / height^2 (in meters).

Assumptions

The subjects were expected to participate to the best of their respective abilities in both the testing and training sessions. A consistent, strong effort by all subjects was encouraged and assumed.

Honest, thoughtfully perceived responses on the body image questionnaires by all subjects were assumed.

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CHAPTER 2

REVIEW OF RELATED LITERATURE

The area of body image has attracted an abundance of research. The literature reviewed concerns theory of body image and earliest research, the scope of the current problem of body image disturbances, the possible causes and consequences of negative body image, a history of measurement of aspects of body image, and treatment of body image disturbances.

Theory of Body Image and Early Research

The importance of body image on the individual has been explored by several theorists in the latter half of the 20th century. Only within the past three decades, beginning in the 1970's, did researchers begin the quest for empirical evidence to substantiate the theories of body image.

Although much research has been conducted in the area of body image, efforts by researchers have been disjointed because of the use of several differing terms, which may or may not have the same intended meaning. The same holds true for the measurement of body image. There is difficulty in discerning whether different instruments are measuring the same construct. The terms body image, body schema, body concept, body ego, and body perception have all been used in the literature. Also, difficulty exists in separating body image traits from other personality traits such as self-esteem, ego, anxiety, and depression; the boundaries are unclear.

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Schilder (1950) was one of the pioneers in the field of body image theory, as he began his work in the early 20th century. Schilder's earliest works were written in German; however, after his death, some of his works were translated into English. Although he dealt with clinical cases, Schilder initiated an interest in the study of body image in normal people. Prior to that time, interest in body image disturbances had been directed toward those with eating disorders in the clinical setting. He also introduced the idea that body image is important to general psychological well-being. Schilder's writings were theoretical, rather than scientific, in nature. He did not engage in controlled experiments, but rather based his theories upon his own philosophical reasoning and clinical observations obtained during psychoanalysis.

Schilder (1950) constructed a model of body image that consisted of three dimensions. The first dimension, physiological basis, is sensory, and involves body perceptions, including tactile and postural feedback, proprioceptive feedback concerning the position of the body and its parts, and perceptions of body shape and muscle tone. The second dimension, libidinous structure, is aesthetic in nature, and involves libido, aesthetic qualities, and manipulation of the body image by clothing, jewelry, and makeup. The final dimension of body image, sociology, involves observation of other people's bodies, imitation of the movements of others, identifying with aspects of the bodies of others, and social fears associated with the body, such as blushing or perspiring. Schilder collectively labeled these three dimensions "body schema."

Schilder (1950) considered body image to be malleable in nature rather than a stable personality trait. Based on his own observations, he believed that a person's body

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image is vulnerable to change, both positive and negative, because of that person's personal history, as well as external feedback (from outside the body) and internal feedback.

Brunch (1962) was the first to systematically introduce a theory on the role of body image problems in the development of eating disorders, designating body image disturbance as one of three necessary factors for the development of anorexia nervosa. In fact, she asserted that negative body image could be the single most important diagnostic feature of the disorder, and that correction in body image is necessary if improvement in the symptoms of anorexia is to be maintained. The profusion of research which followed Brunch's assertions led to the inclusion of a body image criterion for the diagnosis of anorexia nervosa in the Diagnostic and Statistical Manual of Mental Disorders-III (DSM-III) (American Psychiatric Association, 1980).

Also in the 1960's, Stunkard and his collaborators began to study obese patients, and found that individuals with juvenile-onset obesity had severe body dissatisfaction as adults, whereas none of the adult-onset obesity individuals had such severe dissatisfaction with their bodies (Stunkard & Burt, 1967; Stunkard & Mendelson, 1967). This was the basis of the notion that body image disturbances have roots in a person's childhood.

Shontz (1969), another well-known theorist in the field of body image, designated two major components of body perceptions: body schemata and body image. Body schemata is the component which is currently often labeled perception and involves the processing of sensory feedback about the body regarding size and position in space. Body schemata, or perception, is objective is nature. Body image, the second of Shontz's

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components, is commonly labeled the cognitive-affective aspect, and is more subjective. This component consists of the thoughts, feelings, and subsequent personality attributes that result from the evaluation of the more objective perceptual information.

Shontz (1969) believed that body image is both conscious and unconscious in nature, being "the subject as well as the object of mental activity" (p. 170). He also stated that, although body image is assumed to be mental, that it has its "origin in somatic states and events which, under certain conditions, alter the body image or affect it directly" (p. 170). In addition, he purported that body image is both cognitive and emotional, with one's thoughts about the body influencing the emotions.

Shontz (1969) may have been the first to recognize that body image cannot be measured unidimensionally, but rather should be measured according to distinct aspects of body image in a battery of tests chosen so that each test measures a separate component of body image; therefore, the construct of body image and its measurement are both multidimensional. In fact, he considered the body image construct to be so complex that he stated that it is "virtually impossible to see how a concept like the body image . . . could ever be measured in any unequivocal way" (p. 170).

Fisher (1986) also noted that body image is multidimensional in nature, and identified 14 independent facets of body image: general body awareness, body boundary articulation, relative distribution of attention to various body parts, evaluation of one's attractiveness, size perception, perceived masculinity or femininity, ability to judge body position, body-related anxiety, stability of body perceptions, perception of physiological activity of various body systems, inclination towards either overall or compartmentalized

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body image, patterns of chronic complaints/discomforts, structure of the body images, and attribution of feelings more complex than like or dislike (activity, vulnerability, potency). Fisher's writings also expressed the idea that the body image influences behavior (1986), namely, sexual arousal patterns, drug addiction, delinquent behavior, and other behaviors, both positive and negative.

Beginning around 1970, researchers began to test body image theory by conducting studies to establish empirical evidence. In the 1970s and early 1980s, most of the work focused on the size perception aspect of body image, with the more subjective appearance dissatisfaction and affect essentially ignored (Thompson, 1995). Only within the last decade has research begun to concentrate on the cognitive/affective aspect of body image.

History of Body Image Assessment

Research conducted in the area of body image assessment has been plentiful in the past several years, but there is still no consensus on the optimal way to evaluate body image. Most of the measuring instruments have focused on either the perception of body size, or the cognitive and affective aspects of body image. Measurement concerning the perception of body size primarily focuses on the accuracy of one's perception of body size, whereas the cognitive/affective instruments measure attitudes about the body, satisfaction with either individual body parts or the body as a whole, and the importance that one attaches to one's bodily appearance.

Measurement Instruments for Size-Perception Accuracy

The instruments developed to assess the perceptual component of body image

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measure the accuracy of the estimation of body size. The accuracy of size estimation is sometimes referred to as body size distortion. Some instruments have been designed to measure accuracy of estimation of the size of individual body parts, whereas others measure accuracy of estimation of size of the body as a whole. Generally, single-site measurement techniques are easier and less expensive than those which measure the whole body (Thompson, 1995).

Whole-body estimation techniques were the first to appear in practice. Traub and Orback (1964) introduced a distorting mirror technique, which showed the subject a view of his or her body distorted in both the horizontal and vertical planes. Brodie, Slade, and Rose (1989) developed a more advanced distorting mirror. Distorted photographs have been used in the same way. Glucksman and Hirsch (1969) developed a technique in which subjects used an anamorphic lens to adjust a photographic image of themselves to match their perceived body size, with distortions ranging from 20% below their actual body size to 20% above actual size. Variations of this technique were developed by Freeman, et al. (1984) using a videocamera, and by Gardner, et al. (1987) using a TV-video method. In these methods, subjects adjust the horizontal dimension of a TV image to match their perceived size. A study of the reliability of the distorting mirror and videocamera techniques (Brodie, Slade, and Rose, 1989) showed that perceived image was consistently over-estimated; however, both of these techniques produced adequate reliability.

The first technique developed for estimation of individual body parts was the movable caliper, introduced by Reitman and Cleveland (1964). The subject was able to

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adjust the distance between two movable indicators to match perceived size of a body site. In a later version by Slade and Russell (1973), the subject adjusted two lights in an effort to correspond to the estimated size of selected body parts. A similar method, the Body Image Detection Device, was introduced by Ruff and Barrios (1986). This device projected a single beam of light onto a wall, and the subject adjusted it to estimate the size of a single body part. Thompson and Spana (1988) created a variation of these devices, with the Adjustable Light Beam Apparatus, which involved four light beams projected onto a wall; the four beams represented the cheeks, waist, hips, and thighs, and depicted the outline of the body. Askevold (1975) used a slightly more primitive method, with the Image Marking Procedure. Subjects indicated their perceived size by marking two endpoints on a life-sized piece of paper attached to the wall. In all of these measurement methods, the subject's estimation of body size was compared with the actual body size, measured by the test administrator using body calipers. The discrepancy between the actual and the perceived size was then calculated, usually in the form of a ratio representing the over- or under-estimation of body size.

Cognitive/Affective Measurement Instruments

Although size-perception instruments can help detect whether a person can accurately estimate body size, they reveal nothing about the thoughts and feelings regarding the body size. Numerous instruments, mostly in the form of questionnaires, have been developed to measure the thoughts, feelings, and attitudes related to the body's physical appearance. Other than questionnaires, several instruments measure the discrepancy between the ideal body and the perceived body. This deviation score gives

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an indication of the degree of satisfaction or dissatisfaction with one's body.

The silhouette method has been the simplest, most often used method of measuring body satisfaction. Stunkard, Sorensen, and Schulsinger (1983) developed the first of these figure rating scales; this scale showed a continuum of nine body sizes ranging from very thin to very obese. The subject was to choose one of the figures as perceived body size, and one of the figures as ideal body size. The scale is much more accurate if options are not limited to the finite number of drawings, but a continuous scale with responses between two figures are also allowed (Gardner, Friedman, and Jackson, 1998). Fallon and Rozin (1985) developed the Figure Rating Scale, which was very much like the scale of Stunkard, et al. (1983). Using these ratings scales, subjects could describe their personal ideal body size, which figure was most attractive to the opposite sex, and which figure was considered ideal by same-sex peers.

When using these rating scales, the wording of the instructions must be consistent, and should reflect the attitude that is of interest. Thompson and Dolce (1989) found that the question "How large do you feel?" produced larger size estimates than "How large do you think you look?" Thus, the phrasing of the questions could reflect either an affective rating or a cognitive rating.

Another difficulty with the figure drawings is that they represent a continuum of body sizes with regards to fatness rather than muscularity; that is, the figures on the scales range from very thin to very fat. Research by Lynch and Zellner (1999) utilized a set of male figure drawings which showed differing degrees of muscle, rather than fat. Because of the current trend toward preferences of more muscularity in women, this could be a

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disadvantage to using the original "thin to fat" figure ratings for women, also. The Visual Image Rating was developed by Lenart, Goldberg, Bailey, Dallal, and Koff (1995) and validated on college-age women (Goldberg, Lenart, Bailey, and Koff, 1996); the scale offered shading, contouring, and three-dimensionality not shown in the earlier scales.

Some of the same methods used to measure size estimation accuracy have also been used to measure dissatisfaction. The Body Image Detection Device (Ruff and Barrios, 1986) was originally used to measure discrepancy in perceived and actual size. Ruff and Barrios have also used this device to measure discrepancy between ideal size and perceived size; when used in this way, the device becomes an instrument for measuring cognitive/affective variables.

A multitude of questionnaires have been developed to measure body image feelings, attitudes, and thoughts. Most of these instruments are multidimensional in nature; they purport to measure different components of the overall body image construct. The Body Cathexis Scale, developed by Secord and Jourard (1953) was designed to evaluate the degree of satisfaction about different parts and processes of the body; the reliability and structure of the scale were established by Tucker in 1981. The shortcoming of this scale was that it was unidimensional: the developers of the scale assumed that body esteem could be expressed as a single score, based on the sum of responses to various items. The Body Esteem Scale (Franzoi and Shields, 1984) was developed to address this problem, with different dimensions of body image being treated and scored separately as the subject reports degree of agreement with various statements about his or her body. The Body Shape Questionnaire (Cooper, Taylor, Cooper, and Fairburn, 1987)

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is likewise a 34-item questionnaire assessing concern with body shape. A modification of this questionnaire (Mazzeo, 1999), the BSQ-R-10, dealt more with body image preoccupation. Cash, Lewis, and Keeton (1987) devised the Body Image Automatic Thoughts Questionnaire, wherein subjects indicated the frequency with which they experience positive and negative body cognitions.

Perhaps the most widely used questionnaire currently is the Multiple Body-Self Relations Questionnaire (MBSRQ) (Brown, Cash, and Mikulka, 1990), which separates body attitudes into (1) health, fitness, and appearance evaluation, and (2) health, fitness, and appearance orientation. The MBSRQ evaluation categories assess opinions of one's own health, fitness, and appearance, while the orientation categories assess the amount of investment, or importance, that is placed on health, fitness and appearance. The most recent revision of the MBSRQ includes the nine-item Body Areas Satisfaction Scale. The Body-Image Ideals Questionnaire (Cash and Szymanski, 1995) and the Body-size Appraisal Scale and Overweight Preoccupation Scale (Cash, Wood, Phelps, and Boyd, 1991) were similar questionnaires that were derived from existing instruments.

Subscales on larger inventories are sometime utilized in assessing body image. The Body Dissatisfaction Scale taken from the Eating Disorders Inventory (EDI) (Garner, Olmstead, and Polivy, 1983) is frequently cited in the literature as being used independently of the complete EDI.

Factor-analytic studies conducted in recent years (Thompson, Altabe, Johnson, and Stormer, 1994; Williamson, Barker, Bertman, & Gleaves, 1995) identified certain problems found in the multiple-dimension questionnaires. The researchers found

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considerable overlap among many of the questionnaire measures that purport to measure a singular affective, cognitive, or behavioral aspect of body image disturbance (Thompson, 1995). According to the analyses, some of the factor loadings produced overlap in the presumably distinct aspects of body image, which makes interpretation of results ambiguous.

In an effort to address the problem of the overlapping of independent aspects of body image, Rowe (1999) developed the Body Self-Image Questionnaire, which identifies nine distinct areas of body concern. After several revisions, all questions in the questionnaire loaded cleanly on separate factors, and the nine areas did not overlap. Although this questionnaire has not been widely used because it was so recently developed, the instrument shows promise as a useful tool for the assessment of body image.

The preceding discussion of body image measurement instruments is by no means an exhaustive list of methods used. The citations are merely a representation of some of the methods that have been used, with an emphasis on those which are found most frequently in the literature. Even though there exists an abundance of research on body image measurement, few studies have examined the relationship between the affective/cognitive and perceptual aspects; additionally, many studies have examined only female subjects, and very few methods have been introduced to examine children's body image (Gardner, 1996).

Negative Body Image: Scope of the Problem

Body image has become a growing concern, particularly in this country, in the

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past several decades. Women seem to report negative body image more than men, and Caucasians are more concerned with being overweight than African-Americans. These negative perceptions and attitudes toward body image cause concern because they can influence the emotional well-being of the person and also place the person at risk for eating disorders (Sciacca, Melby, Hyner, Brown, and Femea, 1991).

In a 1993 nationwide survey, Cash and Henry (1995) found that 48% of the adult female respondents (n=803) reported negative evaluations of their appearance and a preoccupation for being or becoming overweight. This was a higher percentage than the same researchers reported from a 1985 survey, in which 30% of women between the ages of 18 and 70 had an unfavorable appearance evaluation. An earlier survey, completed in 1972, showed an even lower percentage of women with poor body image; this study, however, used a different survey instrument (Cash, Winstead, and Janda, 1986). These results do provide evidence that women's body images have become more negative in the last two decades.

One trend of great concern is that body dissatisfaction is occurring at increasingly younger ages. Schreiber, et al. (1996) found that approximately 40% of 9- and 10-year old girls (n=2379) who were surveyed reported that they were already trying to lose weight. Of those who were in the highest quartile of body mass index (BMI), approximately 75% were trying to lose weight. No racial differences were found between black and white girls in their efforts to lose weight.

A reasonable assumption would be that body dissatisfaction increases as percentage of body fat increases. A study of 66 college students showed significant

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inverse correlations between body image and percent body fat for both men and women (Huddy, Johnson, Stone, Proulx, and Pierce, 1997).

Although body dissatisfaction is greatest for those who are overweight, normal weight people are often dissatisfied with their bodies, too. Demarest and Langer (1996) evaluated perception of body shape by underweight, average weight, and overweight men and women. Body shape dissatisfaction was greatest for overweight women (n=60), but was also present in average weight women (n=151) and overweight men (n=102). Only the underweight women (n=31) and average weight men (n=107) were satisfied with their body shapes. This study indicates that women often perceive themselves as overweight when their weight is actually within normal range.

Sciacca, et al. (1991) also found that perceptions of body size are often inaccurate. In a survey of 1,123 university students, 17% of the females and 20% of the males were found to be in excess of normal BMI standards. However, 40% of the women considered themselves overweight, compared to only 24% of males. Also, significantly more women (53%) than men (20%) reported that they experienced psychological discomfort because of excessive weight. These results indicate that at least some of the problems with body image are due to inaccurate perceptions of body size.

Cullari and Trubilla (1989) also found body image distortion in college females. In 20 normal-weight females, body image distortion was present in one-half of the sample. The body image distortion in these subjects did not correlate with either body weight or low self-esteem.

Females also have inaccurate perceptions of ideal body shapes, and they tend to

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overestimate other people's preferences for thin female figures. Demarest and Langer (1996) reported that both men and women had distorted views of the shape that the opposite sex found most attractive. In this study, figure drawings were used to evaluate perceptions of body shape. Women thought that men would prefer a thinner female shape than they actually did, whereas men guessed that women would prefer a larger male shape than they actually did.

Cohn and Adler (1992) used silhouettes to study the body shape preferences of same-sex peers, and found that the silhouette that college women selected as most attractive to same-sex peers was significantly thinner than the silhouette that peers actually selected as being most desirable. College men also had an incorrect perception about the body shape preference of same-sex peers, but they inflated the extent to which other men perceived large physiques as desirable.

A similar difference between the sexes was found by Betz, Mintz, and Speakman (1994), who studied 186 college students. In this survey, 30% of normal-weight females perceived themselves as overweight, while 23% of normal-weight males said that they were underweight. Females also underreported their weight to a significantly greater degree, with 84% of the women underreporting their weight.

Davis and Cowles (1991) studied men and women in a broad range of ages, and found men and women to be equally dissatisfied with their weight, but for different reasons. Most of the women (n=112) wanted to lose weight, but the men (n=88) were evenly divided between those who wanted to lose weight and those who wanted to gain. Women showed greater dissatisfaction with their body shapes, however, and placed a

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greater importance on their physical appearance as a factor in their feelings of well-being. Women were also more likely than men to try to exercise in order to lose weight.

Cohn and Adler (1992) also found women to be more dissatisfied with their bodies than men, and determined that they typically desire a thinner body. In a sample of 87 college females, not a single woman selected an ideal figure that was heavier than her own size. In this particular study, the bias towards slimness was not caused by distorted perceptions of their own bodies, but rather that they simply preferred slimmer figures. These women overestimated the extent to which thin figures were attractive to both men and to female peers.

Cullari, Rohrer, and Bahm (1998) also found more body dissatisfaction in women than in men; the females in this sample also experienced more body image distortion. In undergraduate students (n=57), significant differences (p<.05) were found between males and females in weight dissatisfaction, body dissatisfaction, and body image distortion. A sample of eighth graders from the same study (n=98) showed more body and weight dissatisfaction in females than males, also.

In a study of 327 undergraduate students, significant differences were found between men and women for body image-related variables (McKinley, 1998). Women had higher surveillance (viewed their bodies as objects to be watched), higher body shame, greater actual/ideal weight discrepancy, and lower body esteem than did men.

Lewis and Donaghue (1999) found body size to be different from other traits, in that females' self-ratings of body size did not appear to be inflated, whereas self-ratings of other traits did appear to be inflated. In a study of 29 female undergraduate students,

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subjects made self-enhancing judgments regarding their overall attractiveness, sexiness, intelligence, and friendliness. However, the same was not true for body size, where self-ratings tended to be the same as those made by others. The authors attributed these findings to the belief that sexiness, attractiveness, and intelligence are judged with subjective standards, whereas body size is judged with relatively stricter, more uniform standards.

Female athletes who participate in certain sports are at high risk for body image disturbances. Pierce and Daleng (1998) found elite female dancers to rate ideal body size significantly smaller than their own body size, notwithstanding the fact that all of the subjects were in the "ideal" range according to normative standards. In a study of basketball, volleyball, and softball intercollegiate athletes, the athletes (n=31) were found to have significantly more concern about weight than non-athlete controls (DiNucci, Finkenberg, McCune, McCune, and Mayo, 1994). Hallinan, Pierce, Evan, DeGrenier, and Andres (1991) found that female athletes had no better body image than non-athletes, despite the fact that they were in excellent physical condition, and well within the ideal weight range for their particular sports. Many researchers are convinced that female athletes are at risk for developing long-term health problems, and that they get caught in the vicious cycle of the female athlete triad (eating disorders, amennorhea, and osteoporosis) as a result of the desire to be thinner (Nattiv and Lynch, 1994; Overdorf, 1987). An extensive discussion of the risks of negative body image for the female athlete is beyond the scope of this review.

Race and socioeconomic status appear to be factors in body dissatisfaction. Harris

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(1994) found that African-American women reported more satisfaction with their bodies, as well as positive feelings toward them than Euro-American women. African-American women attached more importance to fitness and health, whereas Euro-American women were more concerned with appearance.

Cash and Henry (1995) also found significant body image differences between black women and white women (both Anglos and Hispanics), with blacks reporting significantly more favorable appearance evaluation, more body satisfaction, and less overweight concern than whites. The authors attributed this difference, at least in part, to African-American culture's wider margin of acceptance of women's body size.

Molloy and Herzberger (1998) found that African-American women reported higher levels of self-esteem and a more positive body image than Caucasian women. These authors suggested that the reason for this difference may be a "protective factor" in African-American women. For white women, desire to be thinner is reinforced by the dominant culture's rigid definition of beauty as "ultrathin." African-American women, however, may not always conform to this definition of beauty, because of a difference in the preferences of African-American men. Because men of their race often tend to prefer large women, African-American women feel freer to maintain larger body sizes without sacrificing attractiveness to the opposite sex. Caucasian women lack this "protective factor." These studies do not imply that African-Americans do not have body image disturbances, but only that they are less common that in Caucasians.

The differences in body image among races may be either cultural or socioeconomic; separating the two is difficult. Research by Furnham and Baguma (1994)

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indicated that culture is more accepting of large body sizes in countries with less wealth. After studying 75 British and 106 Ugandan subjects, they concluded that "the greater the wealth (of a country), the more thinness is felt desirable" (p. 87).

Although most of the literature suggests that women in the U.S. prefer a thin body size, some evidence is emerging that the ideal is moving toward a more mesomorphic body type. In a study of 240 male and 226 female undergraduate subjects, mesomorphy was found to be the most important component in the ideal physique for both men and women. The main difference between males and females was that women wanted to be muscular, but they also wanted to be thinner and less muscular than the men desired to be (Butler and Ryckman, 1993). The researchers suggested that because of the fitness movement of the past decade, the traditional female ideal of a thin figure may be blending with a new ideal that emphasizes muscle tone and physical fitness. This research was a replication of earlier findings by Bailey and Hankins (1979) which determined that females value ectomorphy and mesomorphy equally. By 1993, the mesomorphic body type appears to have become even more acceptable than it was in 1979.

Researchers are in disagreement as to whether an age effect exists for negative body image. Pliner, Chaiken, and Flett (1990) and Cash, Winstead, and Janda (1986) found evidence of more negative body image among younger women. However, Cash and Henry (1995) found that body image attitudes were relatively uniform across age groups ranging from 18 to 70 years (n=803). Similarly, Davis and Cowles (1991) found age to be unrelated to body focus or body dissatisfaction for either males (n=88) or females (n=112) in a study including a wide range of ages.

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Body image disturbances do appear to be on the increase in this society, with an increase of as much as 50% in the past 15 years (Cash and Henry, 1995). This is a problem which affects both genders, as well as different racial and ethnic groups. Negative body image is a concern which seems to begin at an early age for many females. This negative image may be a function of inaccurate perceptions of one's own body size, or of a desire for thinness in those who perceive their own body sizes correctly. People who are obese as well as those who are normal weight are at risk for negative feelings about their own bodies; athletes are at greater risk than non-athletes for a poor body image. Negative body image has become more prevalent in our society in the past several years. Because negative body image is related to eating disorders and diminished emotional well-being, ways to improve body image should be considered.

Causes of Negative Body Image

The negative body image of some people is due to difficulties in perception of body size. People with distorted perception see themselves as being larger than they actually are. Researchers have theorized that this problem may be due to failure to adapt the perception of body image while the body size is decreasing; i.e., the person is losing weight at one rate, but the change in body size perception changes at a slower rate (Crisp and Kalucy, 1974). Because following subjects from their maximum weight through months of weight loss is difficult, this theory has not been adequately tested as yet (Thompson, 1995).

Some researchers assert that the inclination to overestimate one's body size is related to the actual body size, with those people who are smaller overestimating to a

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greater extent than those who are large. Empirical evidence has been found for this theory by Penner, et al. (1991), who matched non-eating-disordered, thin women with anorexic women, and found that there was no difference in size perception between these two groups, but that both groups of very thin women overestimated their size significantly more than average-sized control subjects. Coovert, Thompson, and Kinder (1988) correlated actual body size with degree of overestimation of size in a large sample of normal subjects, and found that levels of overestimation in body size were associated with smaller body sizes. This phenomenon has been called "perceptual artifact theory" (Heinberg, 1995).

A considerable amount of research has been conducted which focuses on puberty and physical maturation as a factor in body image disturbances. Because adolescents mature at different rates, body self-consciousness is often observed at this stage of life. Fabian and Thompson (1989) found that postmenarchal girls tend to overestimate the size of their thighs. The girls adapt slowly to their new, adult proportions; this is accentuated when some of their peers still have smaller, childlike bodies.

For this reason, girls who mature early have more body dissatisfaction and eating disorders than those who mature at a slower rate. The explanation for this occurrence could be that those who mature later generally have less body fat and weight (Thompson, 1992).

A tendency for teasing and negative verbal comments directed at those who mature early seems to exist. Fabian and Thompson (1989) found that teasing was correlated significantly to body dissatisfaction, eating disturbance, and self-esteem.

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Brown, Cash, and Lewis (1989) discovered that teens with eating disorders had a greater history of being teased by peers compared with those who did not develop eating disorders. Thompson, Coovert, Richards, Johnson, and Cattarin (1995) found that a history of teasing had a direct influence on body image, eating disturbances, and overall psychological functioning.

Even more subtle negative comments can have an effect on adolescents. Tantleff-Dunn, Thompson, and Dunn (1995) developed an instrument to measure this type of verbal comment and found that even subtle comments are associated with body dissatisfaction and eating disturbances. The negative comments can come from peers, or from well-meaning adults, including the child's parents.

Mothers, in particular, can influence the body image of an adolescent girl. Usmiani and Daniluk (1997) found that mothers' own body images showed a significant positive correlation ($p<.05$) with their menstrual daughters' body images ($n=31$), whereas no correlation existed for mothers and premenstrual daughters ($n=51$). Schreiber, et al. (1996) studied 2379 pre-adolescent girls and found that having a mother who told her that she was too fat increased the likelihood that a pre-adolescent girl would try to lose weight or become a chronic dieter. A mother who told her daughter that she was too thin influenced the daughter's efforts to gain weight. These results were found in both African-American and Caucasian subjects. These studies suggest that mothers have an influence on their daughters' body images, whether by making suggestions about the daughters' weight, or more indirectly, by being concerned about their own body image.

A limited amount of research has been conducted concerning whether sexual

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victimization or sexual abuse place a woman at higher risk for body dissatisfaction. At this time, conclusions are equivocal because results from the research have been inconsistent in this area. Billingham and Patterson (1998) found that women who had experienced sexual victimization during a dating relationship did demonstrate higher body dissatisfaction scores than those who reported no such experience. Thompson (1995) found a similar theme in women who had experienced both overt and covert sexual abuse (inappropriate comments and sexual teasing). However, other researchers (Waller, Hamilton, Rose, Sumra, and Baldwin,1993; Gardner, Gardner, and Morrell,1990) found no greater size overestimation in women who had experienced sexual abuse than in those who had not. Clearly, more research is needed in this area to determine empirically whether there is a link between sexual victimization and body dissatisfaction in women.

The majority of the research concerning causes of body image disturbances has been in the field of sociocultural factors. Most researchers seem to agree that the strongest influences on the development of body image and its disturbances are culture-wide social ideals and expectations (Heinberg, 1995).

The current female body size standard in our society is for thinness to a degree that is out of reach for a person of average body build. While thinness has become almost synonymous with beauty, obesity is seriously criticized (Striegel-Moore, McAvay, and Rodin, 1986). Societal attitudes about thinness put pressure on females to achieve extreme levels of thinness and to avoid any form of obesity. In fact, Vandereycken (1993) used the term "lipophobic" to describe Western cultures.

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In the past two decades, the Western feminine ideal has shifted from the former "hourglass figure" to a thinner, more angular standard. This shift is demonstrated in research by Wiseman, Gray, Mosimann, and Ahren (1992) who found that Miss America contestants from 1979 to 1988 weighed 13% to 19% below expected weights for women their height. In fact, this research shows that the current "ideal" female body actually meets the DSM-IV criteria for anorexia nervosa, based on their low body weight (American Psychiatric Association, 1994).

The role of the mass media in the body image of American women cannot be ignored. Women's magazines have shown a thinner female ideal in recent years, also. Barber (1998) compared the body measurements from models in *Vogue* magazine, which is primarily written for and read by women, with those of *Playboy* magazine, which better represents the male perception of the ideal female body, and Miss America contestants. Results showed that there was a highly significant difference among the three groups ($p<.001$). A post hoc test revealed that the mean bust-waist ratio (a measure of curvaceousness) was significantly less in *Vogue* models than in either *Playboy* models or Miss America contestants, which did not differ significantly from each other ($p>.10$). This research showed that American women's standard for female body attractiveness differs greatly from that of men. Other researchers (Silverstein, Perdue, Peterson, and Kelly, 1986) have shown that there is a trend toward more extreme slenderness in magazine models over the past several years. Women's magazines have also begun to offer significantly more articles on diet, exercise, or a combination of the two over the 30-year period from 1959 to 1989 (Wiseman, et al., 1992). This trend also holds true in

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television commercials, as shown by a study which documented a steady increase in commercials for diet foods, aids, products, and weight loss programs from 1973 to 1991 (Wiseman, Gunning, and Gray, 1993). Actresses in movies and television sitcoms are also increasingly unrealistically thin and beautiful; many women do not realize that these models not only receive hours of professional make-up and hairstyling, but they also adhere to a strict diet and exercise regimen. Many women see these people as everyday people, rather than an unattainable ideal (Thompson, 1995).

Heinberg and Thompson (1995) exposed college-aged females to 10-minute videotapes of commercials that either emphasized a societal ideal of thinness and attractiveness, or contained neutral stimuli which was unrelated to appearance. The subjects who viewed the videotape stressing thinness and attractiveness reported significantly more depression, anger, and appearance dissatisfaction than subjects who viewed the neutral videotape. These results were most conclusive in those subjects who were most predisposed to body image disturbance before the experiment. The subjects with low dispositional levels of body image disturbance were affected to a lesser extent.

Another study suggested that media images may not affect all women in the same way. In an investigation by Henderson-King and Henderson-King (1997), heavier women exposed to ideal images through media reported more negative self-evaluations regarding their sexual attractiveness, while thinner women reported more positive evaluations. Perhaps the woman who is further away from the ideal depicted in the media is more negatively affected by her own body image.

Women who adhere less to an attractiveness ideal may be less affected by media

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ideals. Research by Thornton and Maurice (1997) showed that when women were exposed to photographs of models typifying the idealized thin physique, they displayed decreased self-esteem and increased self-consciousness, social physique anxiety, and body dissatisfaction. Women identified as having low adherence to the attractiveness ideal were influenced to a lesser extent by the photographs, as demonstrated by their self-esteem, self-consciousness, physique anxiety and dissatisfaction scores.

The tendency to compare one's physical appearance to others seems to be related to body dissatisfaction. An explanatory regression analysis by Stormer and Thompson (1995) demonstrated that the majority of variance in body image disturbances and eating disorders can be explained by the tendency to compare one's own body to others, and to internalize societal norms which promote thinness and attractiveness.

Consequences of Negative Body Image

The steady increase in body image disturbances over the last several years is alarming because such disturbances bring about other negative consequences. These include decreased self-esteem, depression, an increased likelihood of eating disorders, changes in a woman's sexual self-schema, and the increased possibility of excessive dieting or exercise. The following citations show relationships between body image and all of these variables. Most of the investigations are correlational in nature; therefore, caution must be taken in drawing conclusions from the results of these studies regarding cause and effect.

In a study of undergraduate women (n=164), Salem and Elovson (1993) found that body satisfaction was positively correlated with self-esteem and negatively correlated

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with depression. In a sample of 57 undergraduate students, Cullari, Rohrer, and Bahm (1998) found that there was a significant correlation between body image dissatisfaction and self-confidence for the women, but not for the men. Stowers and Durm (1996) found significant, positive correlations between body image and self-concept in both genders (n=18 males, 18 females). In undergraduate females (n=42), Grubb, Sellers, and Waligroski (1993) found that depression scores correlated significantly with self-rated body size. These studies demonstrate a significant relationship between body self-image and overall self-esteem.

Other investigations produced more equivocal results. Silberstein, Striegel-Moore, Timko, and Rodin (1988) found that overall body esteem correlated with self-esteem for both men and women; however, measures of weight dissatisfaction did not associate with self-esteem for women. These results introduced the idea of a difference between body esteem and weight satisfaction; a woman may be dissatisfied with her weight, and still not exhibit negative body esteem. Grubb, et al. (1993) found that even though depression scores correlated significantly with body size, self-esteem scores significantly correlated with attractiveness, but not self-rated body size. This study suggests that body size or body weight *per se* may not be a factor in self-esteem, but rather how the body size or weight makes the person evaluate her attractiveness.

McAllister and Caltabiano (1994) examined the self-esteem of 69 women attending weight-loss centers. The number of diets undertaken correlated with lowered self-esteem. Women with stable weight had the highest self-esteem, with the stability of the person's weight being more important than the magnitude of her weight. This study

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points out that body dissatisfaction which leads to frequent dieting or attempts to change the body size is the underlying factor in low self-esteem, and not simply weight or body size.

Sexual self-schema, defined as "the cognitive view of the self regarding sexuality," may also be affected by a woman's self-ratings of bodily attractiveness. In a study of young adult women (n=196), Wiederman and Hurst (1997) found a significant positive correlation (p<.004) between self-rated bodily attractiveness and sexual self-schema, but not between body dissatisfaction and sexual self-schema (p=.21). This study demonstrated that body dissatisfaction and self-rated bodily attractiveness can be separate entities. Perhaps this is an example of the "normative discontent" that is often mentioned; even women who rate their body attractiveness highly are not really satisfied with their bodies.

While low self-esteem yields diminished emotional health, another consequence of poor body image, eating disorders, is even more alarming in that these disorders affect both the physical and emotional health. Although much of the research connecting negative body image with eating disorders has been correlational in nature, a few longitudinal studies have been conducted which support the findings in the correlational studies (Thompson, 1995). Cattarin and Thompson (1994) followed adolescent girls over a 3-year period, and found using an explanatory regression that body image dissatisfaction, not maturational status, was the strongest predictor of an eating disorder. Attie and Brooks-Gunn (1989) studied adolescent girls over a 2-year period and found that initial levels of body dissatisfaction predicted an increase in eating disturbance at the

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end of the 2-year period. These findings were noteworthy, because they also showed that neither family relationships, early physical maturation, nor psychopathology predicted the eating disturbances, but that body dissatisfaction did predict eating disorders.

In a 2-year study of adults, Garner, Garfinkel, Rockert, and Olmstead (1987) found that the development of eating disorders in ballet students was predicted only by body dissatisfaction and restrictive eating tendencies. Striegel-Moore, Silberstein, Frensch, and Rodin (1989) tested college women (n=450) before and after their first year of college, and found that disordered eating was associated with weight dissatisfaction, decreased self-ratings of attractiveness, and increasingly dysphoric feelings about weight.

Frequent dieting has already been discussed as a possible consequence of negative body image, but some people use excessive exercise in an attempt to improve their body image. While exercise is a healthy way to acquire and maintain a healthy body weight, there is a danger when exercise is excessive, or when weight control is the sole motivation for the exercise. In a study by Silverstein, et al. (1988), the researchers assessed female subjects (n=92) in several areas of body satisfaction, self-esteem, dieting, and exercise. Women reported exercising for weight control more than men, and exercise for weight control associated with disordered eating. Smith, Handley, and Eldredge (1998) reported that in 178 undergraduate students, women reported higher body dissatisfaction than men, and also reported exercising for appearance-related reasons more than did men.

Frederick and Morrison (1996) surveyed 326 university fitness-center participants and found that individuals who scored high on the Social Physique Anxiety Scale were

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more likely to have extrinsic motives for exercise (i.e., appearance-related motives) than individuals scoring low on the scale. Those individuals with high scores on the Social Physique Anxiety Scale also exhibited an emotional profile similar to addicted exercisers. Not surprisingly, women scored higher in social physique anxiety than men.

Davis and Cowles (1991) compared physically active women (n=112) and men (n=88) covering a wide range of ages on variables relating to body image, weight and diet concerns, and degree of exercise participation. The women in this group placed greater importance on their appearance as a factor in their feelings of overall well-being, and they were also more likely than men to try to lose weight through exercise.

Total body image was related to exercise level and perceived sexual desirability in a study of 212 college students (Holmes, Chamberlin, and Young, 1994). Similarly, Hallinan and Schuler (1993) found that subjects who participated in regular exercise (n=49) displayed a greater difference between current and ideal figure shape than non-exercisers (n=29) in a study of elderly women 66 to 88 years old. In these studies, as well as in those mentioned previously, drawing conclusions based on the relationship between body image and exercise is inappropriate. While there exists the possibility that women exercise because their body image is poor, the possibility also exists that exercisers are simply more aware of their bodies.

Clearly, negative body image causes a variety of problems to its victims, both physical and emotional. Because there are so many serious consequences which result from body image disturbances, finding ways to treat or prevent negative body image is a worthwhile venture.

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Treatment of Body Image Disturbances

Body image disturbances are often treated with psychotherapy in clinical cases, such as in persons with an eating disorder or body dysmorphic disorder. However, average-weight persons with body dissatisfaction have sometimes been treated with cognitive or cognitive/behavioral treatments also.

Cognitive-Behavioral Therapy Research

Dworkin and Kerr (1987) studied college students with negative body image, using cognitive, cognitive-behavioral, and reflective therapy in different groups, as well as a control group. All three treatment groups showed positive body image changes, with cognitive therapy producing the most changes.

Butters and Cash (1987) compared a 6-week individual therapy treatment group with a control group. The treatment group showed the significant body image improvements to be maintained at follow-up seven weeks later. Improvements included more favorable body image evaluations, less appearance investment, reductions in dysfunctional body image cognitions, and less mirror exposure distress.

Two versions of cognitive-behavioral therapy were compared by Rosen, Cado, Silbert, Srebnik, and Wendt (1990) to determine whether the second version of the therapy, which included exercises to correct perceptual body image distortion, would be more beneficial. Subjects in both treatment groups improved significantly, with both groups producing equally significant improvement. The authors deduced that the body image distortion exercises were nonessential in the cognitive-behavioral therapy program.

Fisher and Thompson (1994) were the first to compare treatment via a cognitive-

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behavioral therapy program with a physical exercise program. Both 6-week treatments produced significant decreases in body dissatisfaction and body image anxiety compared with the control group.

Grant and Cash (1995) compared an 11-week self-directed therapy program consisting of audiocassettes and a client workbook with traditional cognitive-behavioral group therapy of the same duration. Subjects were randomly assigned to one of the treatment groups. The self-directed group met with an instructor for 20 minutes weekly for problem-solving and evaluation of assignments, whereas the traditional therapy group met for 90 minutes weekly for in-depth discussions. The researchers found equally significant gains in body image evaluation and satisfaction as well as reductions in negative body image affect in both groups; this confirmed recent findings that a self-directed format with minimal therapist contact can produce outcomes as favorable as more demanding individual or group therapy.

While these studies show that group, individual, and self-directed cognitive-based therapy is effective, follow-up evaluations have mostly been conducted at two to three months post-treatment. At this point, longer follow-up studies have not been conducted.

Cognitive-Behavioral Therapy: Program Content

While the specific content of various therapy programs differs, the basic ingredients are similar. Cash's (1995) body image therapy program included the following components: (1) comprehensive body image assessment; (2) body image education and self-discovery; (3) body image exposure and desensitization; (4) identifying and challenging appearance assumptions; (5) identifying and correcting

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cognitive errors; (6) modifying self-defeating body image behaviors; (7) body image enhancement activities; and (8) relapse prevention and maintenance of changes. These components are present in group treatment, individual treatment, or self-directed treatment. Cash (1995) emphasized that "booster sessions" are beneficial, as well as follow-up sessions at three months and six months after treatment is completed.

The Role of Exercise in the Treatment of Negative Body Image

In the past decade, the role of exercise as a means of improving negative body image has begun to receive attention in the literature. Many of the studies are correlational or descriptive, but a few have been well-controlled experimental studies (Koff and Bauman, 1997; Tucker, 1987; Ford, et al., 1991; Skrinar, Bullen, Cheek, McArthur, and Vaughan, 1986; and Tucker and Maxwell, 1992). Exercise can have a positive impact on body image because of actual physical changes resulting from exercise, or simply because of the self-efficacy that exercise brings to a person with a poor body image.

In a correlational study, Adame, Johnson, and Cole (1989) found that physically fit men and women had more positive attitudes toward the physical fitness component of their body image. The Winstead and Cash (1984) Body Self-relations Questionnaire was administered to 243 college freshman, in addition to physical fitness tests. Results showed a significant correlation in both men and women between BSRQ-measured appearance and BSRQ-measured fitness ratings, but not between BSRQ-measured appearance ratings and actual fitness scores. In a different account of the same study (Adame, Johnson, Cole, Matthiasson, and Abbas, 1990), analysis of variance was

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conducted, and showed a main effect for body image ($p<.001$) with subjects with good body image being more fit than subjects with poor body image.

In a study of 212 college students, Holmes, Chamberlin, and Young (1994) administered the Body Cathexis Scale (Secord and Jourard, 1953) as well as an exercise frequency/type questionnaire to subjects. Exercisers were found to have better body-image scores than nonexercisers ($p=.0001$).

Finkenberg, et al. (1993) investigated college men and women who participated in classes requiring vigorous physical activity or minimal physical activity ($n=116$ females, 38 males). Students completed the Body Esteem Scale (Franzoi and Shields, 1984) at the beginning and at the end of the semester. A multivariate analysis of variance Wilks lambda was used to detect differences between groups. While overall body esteem scores were significantly higher for sexual attractiveness ($p<.001$), weight concern ($p<.001$) and physical condition ($p<.05$) at the beginning of the semester for women who participated in more vigorous physical activity, a posttest yielded no significant differences between activity groups at the semester's end. No differences existed between activity groups in the initial or end of semester data for the men. These researchers concluded that participation in vigorous activity has an ambiguous relationship to body esteem.

Imm and Pruitt (1991) also encountered mixed results in a study of 28 high-frequency exercisers (6 or more hours/week), 26 moderate-frequency exercisers (3-4 hours/week), and 20 nonexercisers. Each subject answered questions from the Body Shape Satisfaction scale of the Body Shape Questionnaire (Cooper, et al., 1987). Analysis of variance results revealed that the high-frequency exercisers had a significantly

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($p<.0005$) more negative view of their bodies than the moderate-frequency exercisers and the nonexercisers. Additionally, high-frequency exercisers reported that they were more likely to exercise when they had a cold ($p<.005$) or other illness ($p<.001$) than the moderate exercisers, and they reported that they often "pushed themselves to the limit" when exercising more than the moderate-frequency exercisers ($p<.001$). Also, the high-frequency group reported that if they did not exercise, their health would decline, they would gain weight, and they would exercise harder the next day significantly more (on a 7-point Likert scale) than the moderate-frequency exercisers ($p<.003$). The researchers expressed concern that, even though moderate exercise improves body image, those who exercise more frequently than is necessary for good health and fitness may be at risk for developing other psychological problems, such as eating disorders (Imm and Pruitt, 1991).

The preceding studies have shown, for the most part, a positive relationship between exercise and body image. However, they were not actual training studies employing an experimental design. The following citations are well-controlled training studies which actually show whether exercise has a positive impact on body image.

College women ($n=140$) participating in one of three types of physical education classes (wellness, fitness, sport skills) completed the Multidimensional Body-Self Relations Questionnaire (Brown, Cash & Mikulka, 1990) at the beginning and the end of a 6-week program (Koff and Bauman, 1997). The wellness group, who participated in aerobic activity at least three times per week in addition to receiving classroom instruction, showed significant improvement in appearance evaluation ($p=.005$), fitness

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evaluation (p=.05), fitness orientation (p<.001), health evaluation (p=.004), health orientation (p<.01), fitness activities (p<.01), and body satisfaction (p=.007). The fitness group, who participated in either step aerobics, weight training, or running, improved significantly in appearance evaluation (p<.001), fitness evaluation (p=.01), fitness orientation (p<.001), fitness activities (p<.01) and "felt figure" (p=.01). The sports skills group, participating in tennis and racquetball, increased only in fitness activities (p=.001).

Tucker (1987) examined the body cathexis scores of college males involved in either weight training (n=114) or a health course (n=127) but not enrolled in an exercise class. On the pretest, weight trainers and health-class controls did not differ significantly in body cathexis. At the conclusion of the 16-week courses, analysis of covariance results showed a significant difference (p=.0002) in body cathexis scores in favor of the weight training group, with pretest scores treated as the covariate. The investigators performed multiple regression analysis to assess the amount of variance in body cathexis improvement explained by pre-test variables. Significant predictors of body cathexis improvement were pretest absolute and relative muscular strength (inversely correlated with body cathexis change) and perceived somatotype-self and perceived somatotype-discrepancy (directly correlated with body cathexis change). This means that the non-mesomorphs had a greater improvement in body cathexis, as well as those who perceived a self-ideal somatotype discrepancy, compared with those who did not.

In a similar study, Ford, et al. (1991) studied college men (n=78), with an additional 35 men serving as a control group. The subjects participated in classes three hours per week for eight weeks in either strength development, body building, or jogging.

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A 4 (group) x 2 (assessment) factorial analysis of variance tested for differences on the Body Cathexis Scale (Secord & Jourard, 1953) and the Rosenberg Self-esteem Scale (Rosenberg, 1979). For body cathexis, the main effect for group was not significant, but the main effect for assessment was significant ($p<.01$), as well as the group x assessment interaction ($p<.01$). The body-building and jogging groups increased more in body cathexis scores than either the control group or the strength-training group, who showed minimal change from pretest to posttest. In self-esteem, a significant main effect for group membership was not found. The authors concluded that body cathexis scores can be improved by some types of exercise in young men. They postulated that self-esteem may be a more permanent trait, and therefore more resistant to change, than body image (Ford, et al., 1991).

In a study of women 20 to 30 years old, Skrinar, et al. (1986) employed the Body Consciousness Questionnaire (Miller, Murphy, and Buss, 1981) to assess the effects of intensive endurance training on body consciousness. The subjects engaged in an intensive running program for six to eight weeks, in addition to moderate exercise 3.5 hours per day. Before and after training, subjects completed the questionnaire which assessed private body consciousness (focusing on internal bodily sensations), public body consciousness (chronic tendency to be concerned about the external appearance of the body) and body competence (effective body functioning). At the end of the training program, measures of body competence and private body consciousness had significantly increased ($p<.05$), while public body consciousness did not change. A significant correlation ($p<.10$) showed that changes in private body consciousness increased with

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increases in fitness, whereas body competence related more to changes in strength and endurance.

In a later study (Skrinar, Williams, Bullen, McArthur, and Mihok, 1992), a training program of the same intensity but shorter duration, with an interruption midway through the program, yielded no changes in body consciousness. The subjects (n=9) were all female; the training program began with 2-3 weeks of exercise, followed by a 10-day period of no exercise, and concluded with 2-3 weeks of resumed training. The authors concluded that the reduced volume of the training program, as well as the interruption in training, may have been responsible for the lack of changes in body consciousness.

Tucker and Maxwell (1992) investigated the effects of weight training on body image of females. Experimental subjects were 60 females, with a control group of 92 females. Experimental subjects participated in a 15-week, 2-days-per-week weight training program. Subjects were pretested and posttested on the General Well-Being Schedule and the Body Cathexis Scale (Secord and Jourard, 1953). With pretest scores controlled, the weight training group had significantly higher scores in both General Well-Being (p=.0021) and Body Cathexis (p=.0001). These researchers concluded that exercise enhances both body image and general feelings of well-being. Women who were heavier prior to the program showed the greatest improvement; perhaps they had greater expectations for improvement and were more sensitive to body changes than women who weighed less. Relatively shorter females also gained more in body cathexis than taller females, probably because the relatively taller females began the training program being relatively leaner than the shorter subjects. Also, subjects who were not

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involved in any regular physical activity other than the weight training during the program gained more in body attitude scores. This is likely because the regular exercisers began the program in better physical condition, and had better body cathexis scores on pretest. Gains in strength were not mediating factors in General Well-being or Body Cathexis, but body weight and skinfold changes were factors.

In a study of men and women, Salusso-Deonier and Schwarzkopf (1991) examined body cathexis changes with exercise involvement. Fifty-two women and 23 men served as subjects, as well as 41 women and nine men who served as controls. The training period was for one academic quarter; the authors did not reveal the mode of exercise. Controlling for differences in pretest scores, multivariate analysis of variance showed a main effect for fitness class versus control group membership ($p<.048$). The authors concluded that regular exercise seems to have potential as a method for improving body cathexis for both men and women.

Contrary to the previous studies, Ford, Puckett, Blessing, and Tucker (1989) found that exercise did not improve body cathexis in exercisers. The subjects in this investigation, 88 college females, participated in an 8-week, 3-hours-per-week course in either aerobic dance ($n=21$), jogging for fitness ($n=17$), swimming for fitness ($n=15$), life saving ($n=13$), or weight training ($n=22$). Although the fitness groups improved in various fitness parameters (i.e., situps and flexiblity tests), none of the activity groups differed from the controls in self-esteem, body cathexis, step test scores, or percent body fat at the time of posttest. The authors felt that the 8-week duration of the study may have been a factor in the lack of improvement in some of the variables, and that a longer

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program may have produced different results.

Summary

An abundance of research has been conducted in the area of body image, especially concerning its causes, effects, and measurement of different aspects of body image. The literature is somewhat lacking in research concerning successful treatment of body image, however. This is especially true in the arena of exercise as it impacts the body image. While a greater amount of research has shown the effects of exercise on self-concept and self-esteem, research regarding physical activity and its impact on negative body image is just beginning to surface.

There is also difficulty is delineating cause and effect for exercise and body image. Although individuals who exercise seemingly have better body image, the difficulty comes in determining whether those who have better body image are more motivated to exercise, or whether those who exercise regularly achieve better body image. The possibility also exists that people with body image disturbances use exercise in hopes of improving their bodies. Because of these questions which have not been completely answered in previous research, the purpose of this study was to determine whether exercise, with either an aerobic or strength-training emphasis, improves body image among college women who previously had low levels of physical activity.

Although research is sparse concerning the treatment of body image disturbances of both males and females, this study concentrated on females only. Because males and females exhibit different body image issues, i.e., thinness versus muscularity, drawing unambiguous conclusions from a treatment that includes both genders would be difficult.

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CHAPTER 3

METHODS

This investigation was experimental in nature, with body image and physical fitness assessments performed before and after a training program. The subjects in this investigation included an aerobic exercise group, an aerobic/strength training group, and a non-exercise control group. Before the training period began, all participants completed the Body Self-Image Questionnaire (Rowe, 1996) to assess nine separate body image components. Additionally, subjects participated in fitness testing in the parameters of body composition, cardiorespiratory endurance, and muscular endurance in order to determine whether body image changes related to improvements in physical fitness. The subjects in the two experimental groups then completed a 12-week, 3-times-per-week program of either aerobic exercise or aerobic/strength combination exercise. The Control group subjects reported that they did not participate in vigorous exercise during the 12 weeks. At the conclusion of the 12-week training program, all subjects again completed tests measuring physiological and psychological parameters.

Subjects

The control group and the two experimental groups each consisted of 20-30 women, ages 18 to 26, as shown in Table 1. The subjects were volunteers from the Lipscomb University student population; these subjects represented a sample of 72 (69 Caucasians, 3 African-Americans) out of a total of approximately 1000 female students in

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the 18- to 26-year-old age group. Subjects in the experimental groups were recruited by posting flyers on the Lipscomb campus advertising a free exercise program, as well as by a campus-wide e-mail advertisement. Students who were beginning another exercise program or taking a fitness-based activity class were excluded from the study, as were eating-disordered females. Subjects in the control group were volunteers enrolled in an exercise science class unrelated to fitness or body image; these subjects reported either a sedentary lifestyle or participation in a limited amount of nonvigorous exercise.

Table 1

Subject Descriptive Data

	Aerobics (n=23)*	Aerobics/strength (n=28)*	Control (n=21)*
	Mean ± SD	Mean ± SD	Mean ± SD
Age (yrs)	19.4 ± 1.2	19.1 ± 1.6	20.1 ± 1.6
Weight (kg)	63.8 ± 13.2	61.3 ± 7.3	63.7 ± 11.3
Height (in)	65.6 ± 2.2	64.6 ± 1.9	66.2 ± 3.5
Body mass index (kg/m^2)	22.9 ± 4.3	22.8 ± 2.5	22.4 ± 2.8

* One subject withdrew from each group. Sample sizes reflect intact groups.

Testing Procedures

Institutional Review Board Approval (Appendix A)

Institutional Review Boards from Lipscomb University and Middle Tennessee State University approved all testing procedures before testing began. The review boards granted permission for testing procedures for up to one year from the date of approval.

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Body Self-Image Questionnaire (BSIQ--Appendix C)

After the researcher gave standardized instructions for completing the body image questionnaire (Appendix B) and before fitness testing began, all subjects completed the Body Self-Image Questionnaire (Rowe, 1996). The BSIQ (Appendix C) is a 51-item questionnaire in which each question is designated to one subscale of the BSIQ, each of which represents a separate component of body image. The instrument consists of three evaluative subscales:

(1) appearance evaluation–overall estimation of one's appearance;

(2) fatness evaluation–estimation of overall fatness of one's body;

(3) health/fitness evaluation–estimation of one's overall physical fitness/health status. The instrument also includes the following subscales which do not involve evaluation:

(4) health/fitness influence–the degree to which one's health and fitness influences the way one feels about his or her body;

(5) attention to grooming–the amount of time and effort spent in manipulating one's appearance;

(6) social dependence–effect of social situations or social acceptance on one's body image;

(7) height dissatisfaction–desire to be taller or shorter;

(8) negative affect–the negative thoughts and feelings associated with body image; and

(9) investment in ideals–importance of and aspirations to achieve a perfect body.

Because the BSIQ is multidimensional in nature, the scoring does not yield one composite body image score, but rather scores on the nine subscales which are

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independent of each other. This questionnaire was developed using rigorous factor analysis, and was validated and cross-validated on several samples of both normal and eating-disordered subjects (Rowe, 1999).

After a few initial demographic questions assessing ethnicity, class rank, and sports participation, the 51 body image questions were answered in a Likert format, with responses ranging from 1 (not at all true of myself) to 5 (completely true of myself). The 51 questions pertained to feelings and attitudes about one's body. Each of the 51 questions factors into one of the nine body image subscales. The scores on items 3 and 13 were reverse scored in order to align with the direction of their respective subscales.

At the time of administration of the BSIQ, subjects also completed an informed consent for both the testing and training protocols, as well as PAR-Q, a physical activity readiness questionnaire. The purpose of administering the PAR-Q was to identify any health problems that would make the testing or training unsafe for the participant.

Physical Fitness Testing

After participants completed the BSIQ, each subject participated in a physical fitness test which evaluated body composition, cardiorespiratory endurance, and muscular strength/endurance. Body composition was assessed first, using 3-site skinfolds (Jackson, Pollack, and Ward, 1980). Next, subjects completed the Queens College Step Test to estimate cardiorespiratory endurance (Safrit and Wood, 1995), followed by a submaximal bench press test to assess muscular strength and endurance (Golding, Myers, and Sinning, 1982). Each participant completed the tests in the same order. Subjects completed the tests individually, except for the step test, in which three subjects were

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tested at once. The testing laboratory was kept at a constant temperature of 70° F.

Skinfold test (Appendix E). Tricep, suprailiac, and thigh skinfolds predicted body composition, with at least two measurements taken at each site. If the two measurements did not agree, a third measurement was taken. Body density was calculated from the sum of three skinfolds using the generalized equation by Jackson, Pollock, and Ward (1980):

> Body density = 1.099421 - 0.0009929 (sum of 3 skinfolds) + 0.0000023 (sum of skinfolds)^2 - 0.0009929 (age in years).

This regression equation was validated on females ages 18-55 (n=249), with a validity coefficient of .87 (SEE = .008 g/cc). Body density was converted to percent body fat using the Siri equation (Siri, 1956):

> % fat = (495 / body density) - 450.

Step test (Appendix E). Researchers administered the Queens College Step Test for evaluation of cardiorespiratory fitness . The test protocol for women consists of 3 minutes of stepping on a 16¼" bench at a cadence of 22 step cycles per minute. Recovery heart rate is counted for a 15-second period starting five seconds after the test is completed. VO_2 max is predicted from the pulse count (Safrit and Wood, 1995). McArdle, Katch, Pechar, Jacobson, and Ruck (1972) reported a validity coefficient of .75, with a SEE of 2.9 ml·kg^{-1}·min^{-1} when validating the test on 41 college women. The criterion test with which the step test was compared was a maximal treadmill test using the Balke protocol. The step test is highly reliable (r=.92).

Three subjects at a time completed the step test. Post-exercise heart rate was

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measured using heart rate monitors, with a reading taken 15 seconds after the test was completed. Two research assistants aided in reading the heart rates at the proper time to ensure that all three examinees' heart rates were read simultaneously. VO_2 max was predicted from the following regression equation (McArdle, et al., 1972):

VO_2 max = 65.81 - (0.1847 x post-exercise heart rate).

A metronome set at 22 complete step cycles per minute set the cadence for the test. Subjects were encouraged to keep the tempo accurately for the entire three minutes.

The Queens College step test was chosen because it has demonstrated acceptable validity and reliability (McArdle, et al., 1972), and administration of the test can be accomplished with ease and accuracy. Regardless of whether the test estimates VO_2 max accurately, the posttest would likely yield a decrease in post-exercise heart rate, which would confirm that a cardiorespiratory training effect has taken place.

Bench Press Test (Appendix E). Subjects completed the YMCA Bench Press Test (Golding, Myers, and Sinning, 1982) to assess muscular strength and endurance. The protocol requires the subject to lift a 35-lb. barbell from the chest position to full arm extension at a cadence of 60 lift cycles per minute. The test is completed when the subject can no longer lift the bar, or when the subject can no longer lift at the specified tempo. Each subject completed this test individually, with a metronome setting the cadence.

The YMCA Bench Press Test was chosen because it is a submaximal test. This type of test is safer than a 1 RM bench press test, because no maximal contractions are required. Validity and reliability data have not been published for the YMCA test;

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however, submaximal bench press tests have been found to have logical validity as an endurance measure, and concurrent validity as a strength measure. Submaximal bench press tests have a high correlation with the maximum weight lifted in one repetition (r>.90). Reliability can be expected to be high if examinees are motivated to achieve maximal performance (Safrit and Wood, 1995).

At the conclusion of the pre-test procedures, subjects in the two experimental groups began a 12-week training program of either aerobic exercise or combination aerobic/strength training. Subjects in the control group did not participate in vigorous exercise during the 12 weeks.

Training Program

The aerobic exercise group participated in 12 weeks of step aerobics, three times per week. Each session was 50 minutes in duration, with 35 minutes per session devoted entirely to aerobic exercise. The other 15 minutes of the class period consisted of warm-up, cool-down, and limited muscular endurance exercises (i.e., abdominals, light resistance exercises). Subjects were urged to adjust exercise intensity to maintain a heart rate of 60-90% of their age-predicted maximum heart rate (220-age). Subjects recorded their heart rates on a chart at least once per class session, to insure that they were performing exercises at the prescribed intensity. The instructor demonstrated variations in step exercise to accommodate for individual differences in fitness levels; therefore, all subjects were able to exercise within the recommended intensity in the class setting.

The aerobics/strength training group participated in a class which utilized a circuit combining cardiovascular and muscular strength/endurance training. The circuit involved

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the use of jump rope, cardio-boxing, 3-kg medicine balls, 8-lb. dumbbells, body resistance exercises, and agility drills. Each training session was 50 minutes in duration, including warm-up and cool-down to pre-exercise levels. The instructors led all exercises, including the warm-up and cool-down. Although the instructors encouraged participants to push themselves to train at a high level, accommodations for individual fitness levels were made. All participants did not exercise at the same absolute intensity, but all participants were urged to attain the same relative intensity.

The rate of compliance in both experimental groups was high, with 90.2% compliance in the aerobics/strength group and 91.2% compliance in the aerobics group. Compliance was defined as: (number of classes attended / 35 total classes) x 100.

Retest procedures

At the conclusion of the 12-week training program, all experimental and control group subjects were retested using identical testing procedures as in the pretest, including the body image and physical fitness tests. Test order was the same as the pretest, and each group of subjects reported to the lab at the same time of day that they had performed the pretest.

Data storage and confidentiality

A secure, password-protected spreadsheet file stored all body image and fitness data. Confidentiality of individual subjects was retained by use of an ID number rather the subject's name on each data sheet. The ID number allowed the researcher to match fitness data with body image responses, and allowed for pretest-posttest matching of individual subjects, without revealing the identity of specific subjects.

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Statistical Analysis of Data

Pretest scores were analyzed with a series of analyses of variance (ANOVA) to determine pre-existing group differences. No differences existed among groups in any of the physical fitness or body image variables at pretest (Appendix H).

Posttest scores on physical fitness parameters and body image subscales were analyzed using a series of analyses of covariance (ANCOVA), with the pretest scores being treated as the covariate. In ANCOVA, the amount of unexplained variance is lower than in an analysis of variance (ANOVA) conducted on individual change scores; this decreases the error term, thereby giving the ANCOVA more statistical power for detecting group differences. Additionally, the ANCOVA makes adjustment in the posttest scores for pre-existing group differences in the pretest scores.

Where significant differences were found among the aerobic, aerobic/strength, and control groups, Tukey/Kramer post hoc tests were performed for each pairwise comparison to find where the differences among groups occurred. The Tukey/Kramer post hoc method (Hinkle, Wiersma, and Jurs, 1998) makes an adjustment to the more traditional Tukey HSD test which allows for comparison of adjusted means and makes allowance for the effect of the covariate by using the following equation:

$$Q_{obs} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{MS''_w\left(\frac{(1/n_1)+(1/n_2)}{2}\right)}} \quad \text{where } MS''_w = MS_w\left(1 + \frac{SS_{b(x)}}{SS_{w(x)}}\right)$$

and: $\bar{x}_1$ and $\bar{x}_2$ are adjusted means for each comparison group
n_1 and n_2 are number of subjects in each comparison group
$SS_{b(x)}$ = covariate sum of squares between groups
$SS_{w(x)}$ = covariate sum of squares within groups

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Q_{obs} was then compared with the critical value of Q with degrees of freedom set at k (number of groups) and df_w (number of subjects - number of treatment groups).

The 95% confidence level ($p<.05$) was used to establish significance in all comparisons in both the analyses of covariance and pairwise comparisons.

Assumptions of the ANCOVA

The data met the assumptions of the analysis of covariance satisfactorily.

1. Homogeneity of variance. Lavene's test of equality of variance revealed no significant differences in variances among the groups in any of the dependent variables.

2. Normality. No noticeable departures from normality existed in any of the dependent variables.

3. Independence of scores. Each subject's scores on both the covariate and the dependent variable were independent of the scores of all other subjects, because subjects were tested individually.

4. Linearity. The regression of the dependent variable on the covariate was generally linear in each group.

5. Homoegeneity of regression slopes. The regression of each dependent variable on its respective covariate was the same in each group, with one exception. This variable is discussed separately in Chapter 5.

6. Independence of covariate and treatments. The covariates and the treatments were independent of each other; by removing the variability in the dependent variable that is predictable from the covariate, no part of the treatment effect was removed. In other words, the treatments could not possibly have affected scores on the covariates.

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7. Covariate measured without error. The covariates were measured as reliably as possible, and tests with good reliability coefficients were chosen for the study.

Other statistical treatments

Effect sizes ($\bar{x}$ pretest - $\bar{x}$ posttest) / pooled standard deviation) (Thomas and Nelson, 1990) were also reported to give an indication of meaningful change in each parameter. Effect size was defined by Cohen (1992) as follows: .20 = small effect size; approximately .50 = medium effect size; approximately .80 or larger = large effect size.

Correlations between the change scores of variables were examined to determine whether the changes in certain variables may be related to the changes in other variables. Pearson correlation was calculated for the pretest to posttest change scores between all combinations of variables.

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CHAPTER 4

RESULTS

Physical Fitness Variables

In order to have an impact on body image variables, the aerobics and aerobics/strength training programs must be effective in improving the fitness profiles of the subjects. Table 2 depicts the pretest and posttest scores for each fitness variable, as well as the effect size (ES) of the change. The aerobics group change yielded a small

Table 2

Pretest and Posttest Means, Standard Deviations, and Effect Sizes for Physical Fitness Variables

	Aerobics			Aerobics/strength			Control		
	Pre-Mean (SD)	Post-Mean (SD)	ES	Pre-Mean (SD)	Post-Mean (SD)	ES	Pre-Mean (SD)	Post-Mean (SD)	ES
%Fat	23.54 (6.69)	22.09 (5.55)	-.23	23.02 (5.00)	20.19 (4.65)	-.32	22.28 (6.14)	22.86 (5.47)	.09
VO_2 max	35.77 (4.69)	36.96 (4.22)	.27	35.12 (2.90)	37.40 (3.01)	.77	36.48 (3.66)	36.26 (3.02)	-.06
Bench	21.38 (9.23)	26.00 (10.82)	.46	24.25 (10.23)	26.00 (10.48)	.87	26.05 (9.93)	27.10 (11.08)	.10

VO_2 max = VO_2 max in $ml \cdot kg^{-1} \cdot min^{-1}$

Bench = number of bench press repetitions

$$ES = \frac{\text{Pretest Mean - Posttest Mean}}{\text{pooled standard deviation}}$$

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effect size (Cohen, 1992) for percent fat and VO_2 max improvement, and a medium effect size for strength improvement. The aerobics/strength group likewise demonstrated a small effect size in decrease in percent body fat, but demonstrated large effect sizes in VO_2 max increase and strength increase, as shown by bench press scores. Effect sizes in the control group indicated that no meaningful changes occurred. The improvement in the aerobics group in strength was likely due to the upper body movements utilized in the aerobic step classes, because other upper-body strength exercises during the aerobics classes were minimal. The larger effect size in VO_2 max improvement in the aerobics/strength group as compared to the aerobics group was probably due to the additional aerobic training effect caused by the circuit strength exercises.

Analysis of covariance comparisons among groups revealed at least one significant difference among the mean posttest scores of the three groups in all physical fitness variables (Table 3). The post hoc comparisons between means revealed significant differences ($p<.05$) between means in all pairwise comparisons of percent body fat, with the aerobics/strength group having the lowest percent fat, followed by the aerobics group; the control group had the highest percent fat (Figure 1).

The aerobics/strength group had a significantly higher meanVO_2 max ($p<.05$) than the control group, but no other differences between means were significant. In number of bench press repetitions, the aerobics/strength group mean was significantly higher ($p<.05$) than both the aerobics group and the control group; the difference between the Aerobics group and the control group in mean bench press repetitions was not significant. Figure 1 depicts the results of the Tukey/Kramer pairwise comparisons.

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Table 3

Posttest Group Data for Physical Fitness Variables – Adjusted Means (SD)

	Aerobics (n=23)	Aerobics/strength (n=28)	Control (n=21)	p
Body Fat (%)	21.62 (5.6)	20.14 (4.7)	23.44 (5.5)	.000*
VO_2 max ($ml \cdot kg^{-1} \cdot min^{-1}$)	36.85[a] (4.2)	37.91 (3.0)	35.68[c] (3.0)	.004*
Bench Press (no. of reps)	28.57[b] (10.8)	33.39 (10.5)	25.13[c] (11.1)	.000*

*significant difference among group adjusted means ($p<.05$)

[a] n = 22

[b] n = 21

[c] n = 20

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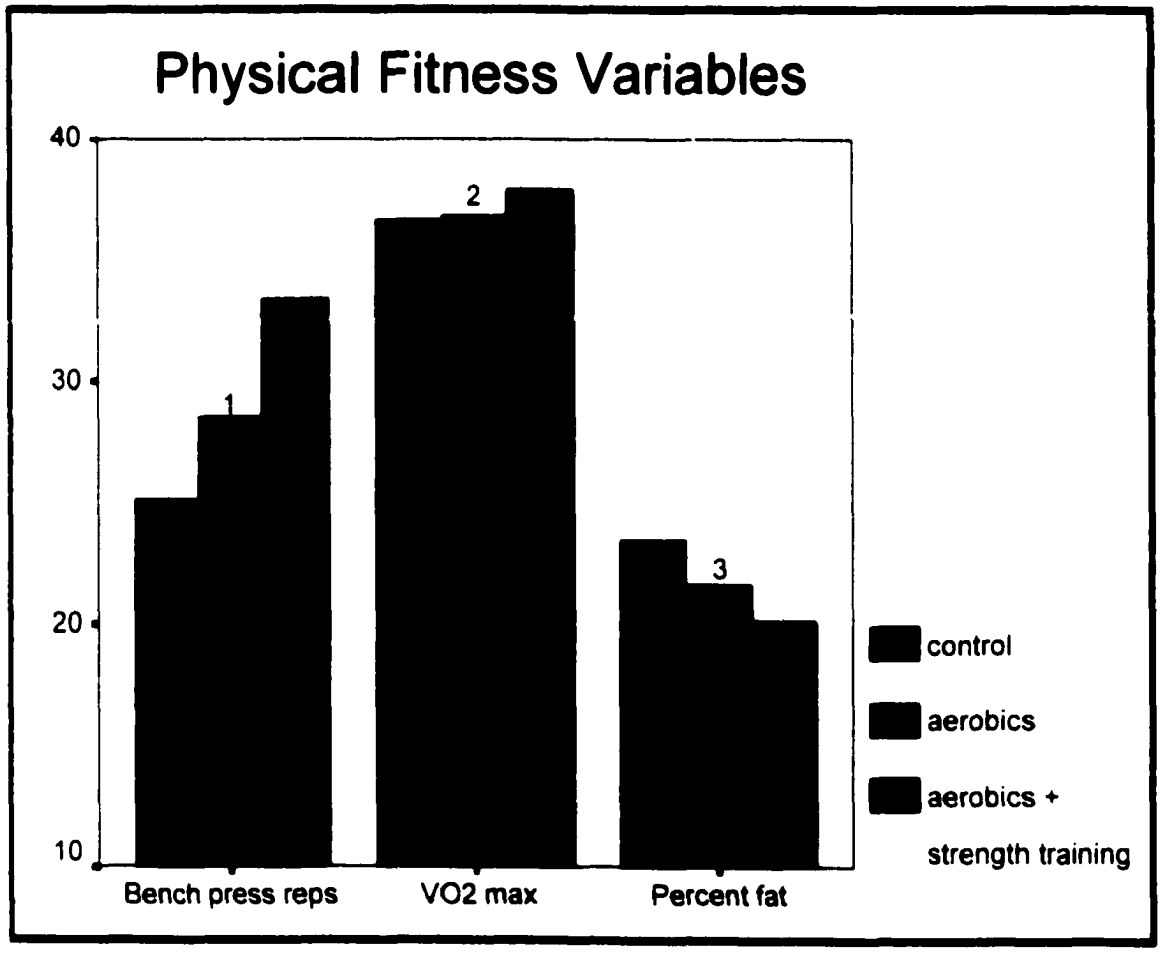

Figure 1. Pairwise comparisons for physical fitness variables (adjusted means).

1 -Aerobics + strength training > aerobics and control ($p<.05$)

2 -Aerobics + strength training > control ($p<.05$)

3 -Aerobics + strength training > aerobics > control ($p<.05$)

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Body Image Variables

In the discussion of the body image variables, the terms "improvement" or "more positive" describe the changes in variables rather than "decreased," "increased," "higher," or "lower." These terms were used because on the subscales of fatness evaluation, social dependence, height dissatisfaction, negative affect, and investment in societal ideals, a low score represents a more positive body image. For overall appearance evaluation, attention to grooming, health/fitness evaluation, and health/fitness influence, a higher score is indicative of a more positive body image.

Table 4 depicts the pretest and posttest scores for each body image subscale, as well as the effect size of the change in each subscale. The largest effect sizes were found in the aerobics/strength group in improvements in overall appearance evaluation, health/fitness evaluation, health/fitness influence, and negative affect.

Analysis of covariance results revealed at least one significant difference among the three groups in the body image subscales of overall appearance evaluation (p=.036), fatness evaluation (p=.028), attention to grooming (p=.038), health/fitness evaluation (p=.026), height dissatisfaction (p=.029), and negative affect (p=.016). No significant differences were found in health/fitness influence, social dependence, or investment in ideals (Table 5). Tukey/Kramer post hoc tests (Figures 2 and 3) revealed that in overall appearance evaluation (Q_{obs} = 3.42), fatness evaluation (Q_{obs} = 3.84), attention to grooming (Q_{obs} = 3.44), and negative affect (Q_{obs} = 4.11), the aerobics/strength training group had significantly more positive body image scores than the Control group; no other differences between means were significant for these variables ($Q_{critical}$ = 3.40).

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Table 4

Pretest and Posttest Means, Standard Deviations, and Effect Sizes for Body Image Variables

	Aerobics			Aerobics/strength			Control		
	Pre-Mean (SD)	Post-Mean (SD)	ES	Pre-Mean (SD)	Post-Mean (SD)	ES	Pre-Mean (SD)	Post-Mean (SD)	ES
OAE	19.65 (5.7)	20.26 (5.5)	.10	18.93 (5.3)	21.50 (4.5)	.52	21.05 (4.8)	20.95 (3.9)	-.02
FE	29.91 (8.7)	29.35 (9.3)	-.06	29.21 (9.4)	26.61 (9.9)	-.27	24.48 (10.1)	25.67 (11.3)	.19
AG	16.35 (2.4)	16.43 (2.5)	.03	15.89 (2.3)	16.21 (2.2)	.14	16.14 (2.7)	15.10 (2.9)	-.37
HFE	24.74 (4.8)	24.43 (5.51)	-.04	22.32 (4.9)	25.68 (4.8)	.69	23.76 (5.1)	24.71 (6.8)	.16
HFI	23.83 (3.5)	25.00 (3.5)	.33	23.29 (3.2)	24.96 (3.1)	.54	23.38 (5.2)	23.52 (3.7)	.19
SD	11.43 (2.1)	11.43 (2.50)	0	11.43 (2.1)	10.82 (2.4)	-.23	10.00 (4.0)	10.10 (3.7)	.26
HD	8.35 (4.2)	8.52 (4.0)	.04	6.89 (3.8)	5.93 (3.2)	-.27	6.33 (3.9)	6.00 (3.9)	-.08
NA	18.17 (7.4)	16.52 (7.1)	-.23	17.93 (6.8)	14.29 (6.0)	-.57	13.29 (7.6)	14.14 (7.1)	.11
II	29.70 (4.3)	28.65 (5.0)	-.23	27.93 (5.2)	27.39 (4.7)	-.10	26.43 (7.2)	25.90 (7.4)	-.07

OAE = overall appearance evaluation; FE = fatness evaluation; AG = attention to grooming; HFE = health/fitness evaluation; HFI = health/fitness influence; SD = social dependence; HD = height dissatisfaction; NA = negative affect; II = investment in ideals

$$ES = \frac{\text{Pretest Mean - Posttest Mean}}{\text{pooled standard deviation}}$$

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Table 5

Posttest Group Data for Body Image Variables–Adjusted Means (SD)

	Aerobics (n=23)	Aerobics/strength (n=28)	Control (n=21)	p
OAE	20.35 (5.5)	20.09 (4.5)	20.07 (3.9)	.036*
FE	25.56 (9.3)	25.49 (9.3)	29.12 (11.3)	.028*
AG	16.27 (2.5)	16.37 (2.2)	15.07 (2.9)	.038*
HFE	23.45 (5.5)	26.64 (4.8)	24.52 (6.8)	.026*
HFI	24.78 (3.5)	25.09 (5.6)	23.59 (3.7)	.058
SD	11.16 (2.5)	10.55 (2.4)	10.76 (3.7)	.625
HD	7.60 (4.0)	6.17 (3.2)	6.69 (3.9)	.029*
NA	15.38 (7.1)	13.33 (6.0)	16.67 (7.1)	.016*
II	27.27 (5.0)	27.50 (5.7)	27.28 (7.4)	.957

* significant difference among adjusted means ($p<.05$)

OAE = overall appearance evaluation; FE = fat evaluation; AG = attention to grooming
HFE = health/fitness evaluation; HFI = health/fitness influence; SD = social dependence
HD = height dissatisfaction; NA = negative affect; II = investment in ideals

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In two of the body image variables, the aerobics/strength training group scores were significantly more favorable than the aerobics group. In health/fitness evaluation, the aerobics/strength training group scores were significantly higher than the aerobics group; however, there were no differences between means in any of the other pairwise comparisons.

Similarly, on the variable of height dissatisfaction, a significant difference existed at posttest between the two training groups. Although analysis of variance showed no differences in height dissatisfaction among the group pretest scores, post hoc test results showed the aerobics group to be more dissatisfied with their height than the aerobics/strength training group. Further inspection of the data revealed that, while the aerobics group did not change in height dissatisfaction, the aerobics/strength training group improved significantly (p=.013).

The results of the Tukey/Kramer post hoc tests for pairwise comparisons are depicted in Figures 2 and 3. Note that in the variables shown in Figure 3, low scores represent more positive body image attitudes.

Correlations between Variables

One further analysis of interest is that of the correlations between the change scores of body image and physical fitness variables. Put more simply, which changes in physical fitness seem to be related to which changes in body image? Zero-order correlations were performed on the change scores of all physical fitness variables and body image subscales in order to answer this question (Appendix I).

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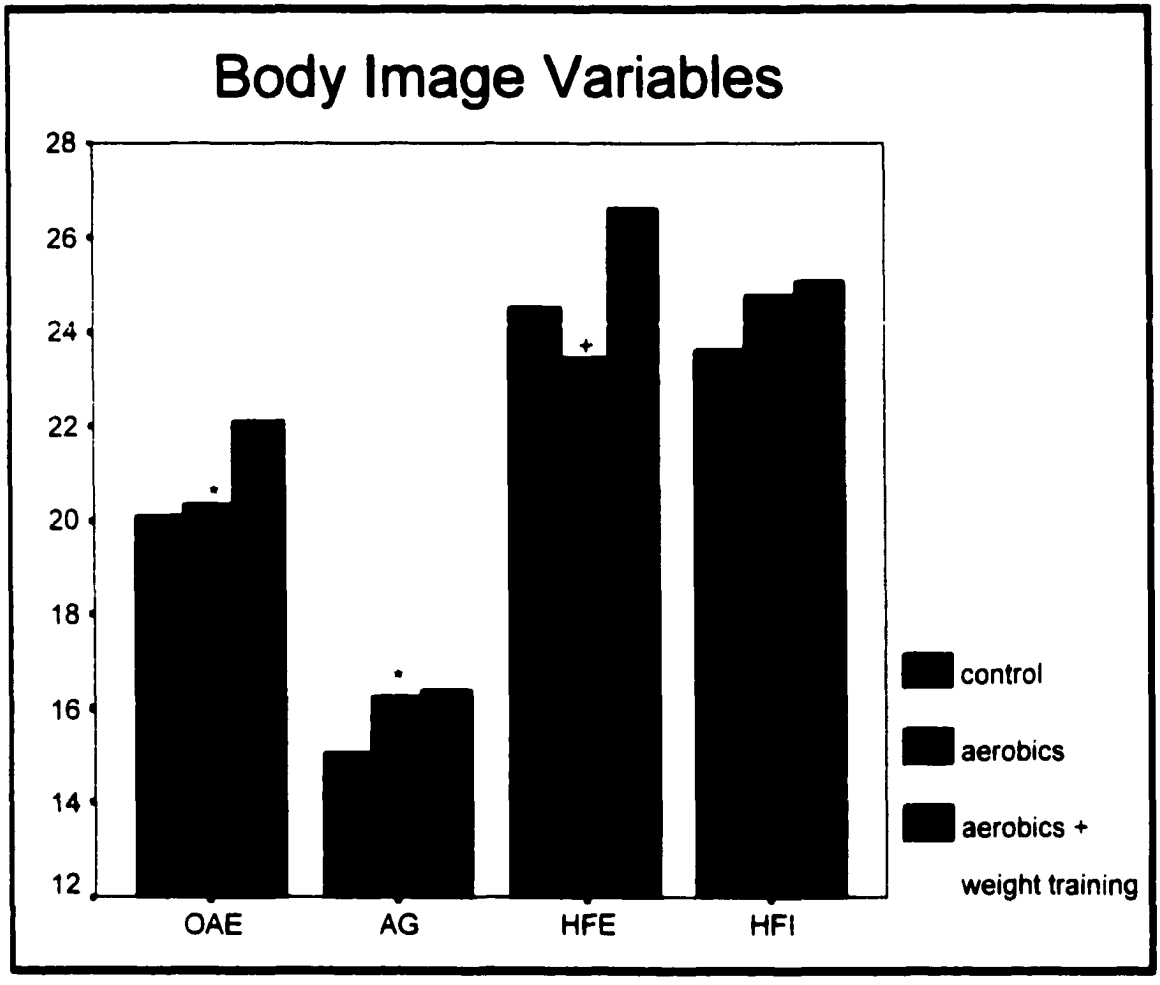

Figure 2. Pairwise comparisons for body image variables (adjusted means).

* Aerobics + strength training > control ($p<.05$)

\+ Aerobics + strength training > aerobics ($p<.05$)

OAE = overall appearance evaluation

AG = attention to grooming

HFE = health/fitness evaluation

HFI = health/fitness influence

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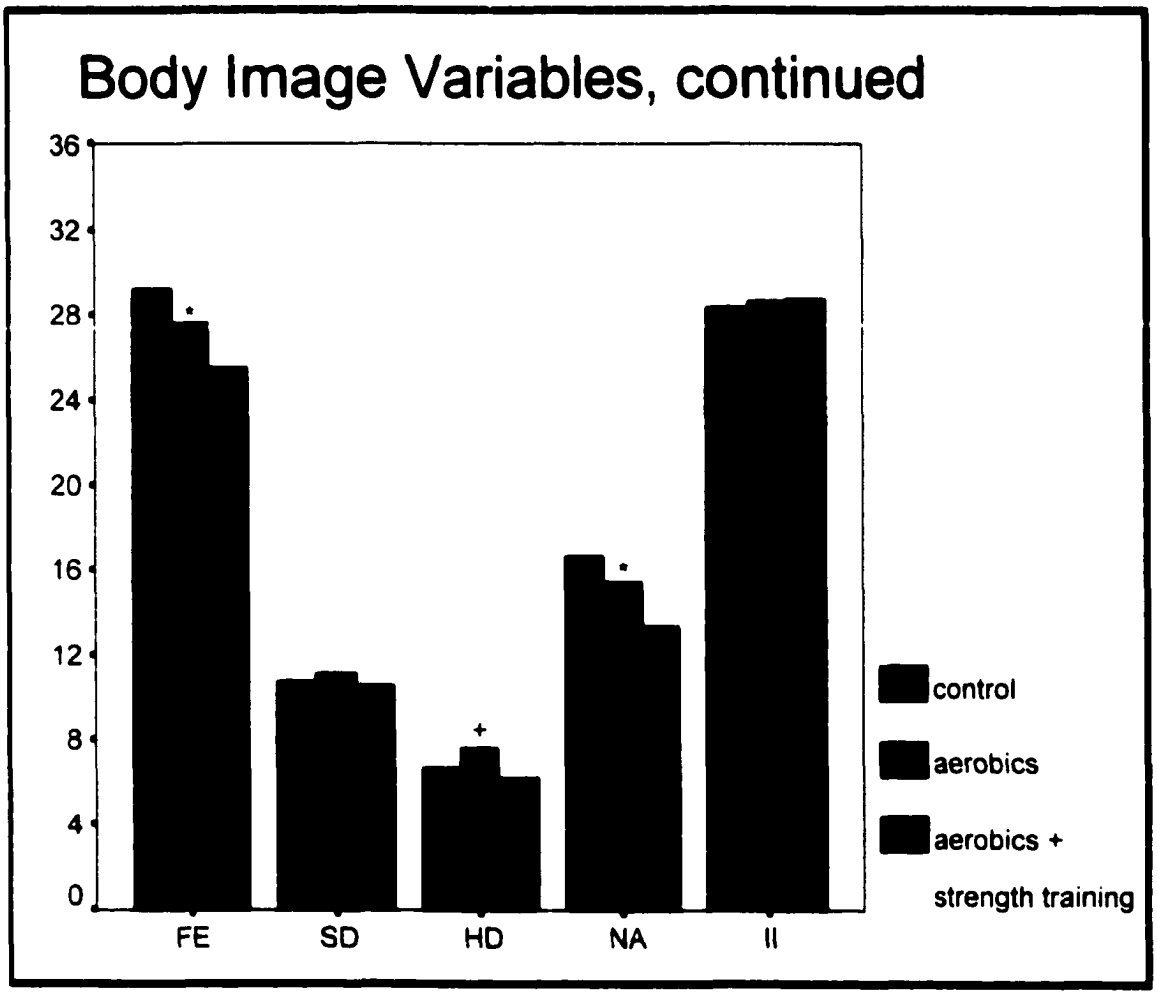

Figure 3. Pairwise comparisons for body image variables, cont. (adjusted means)

Note: low scores denotes positive attitudes.

* Aerobics + strength training < control ($p<.05$)

\+ Aerobics + strength training < aerobics ($p<.05$)

FE = fat evaluation

SD = social dependence

HD = height dissatisfaction

NA = negative affect

II = investment in ideals

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As expected, changes in percent body fat correlated with improvements in overall appearance evaluation ($p<.01$). Changes in body strength as shown by bench press scores correlated with both an increase in attention to grooming ($p<.05$) and a decrease in negative affect ($p<.01$). Improvements in VO_2 max correlated most highly with a decrease in fatness evaluation ($p<.05$).

Within the physical fitness variables, a significant inverse correlation ($p<.01$) existed between changes in VO_2 max and changes in percent body fat, with VO_2 max increasing as percent fat decreased. A similar direct correlation existed between changes in percent body fat and changes in exercise heart rate following the step test ($p<.01$).

Examination of the correlations among change scores in body image variables revealed several significant correlations. Changes in overall appearance evaluation correlated inversely with changes in fatness evaluation ($p<.01$) and negative affect ($p<.01$), and positively with changes in health/fitness evaluation ($p<.05$). Additionally, changes in fatness evaluation correlated positively with changes in social dependence ($p<.01$), negative affect ($p<.01$), and investment in ideals ($p<.01$). The positive relationship between changes in fatness evaluation and changes in negative affect was the strongest of all correlations.

Changes in social dependence correlated positively with changes in both negative affect ($p<.01$) and investment in ideals ($p<.01$), which also correlated positively with changes in health/fitness investment ($p<.05$).

These correlational data support the idea that, while the subscales of the Body Self-Image Questionnaire are independent of each other and do measure separate

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attributes, relationships do exist among the change scores of the nine body image variables. While this does not prove that a change in one body image component causes a change in another component, the relationships between variables are interesting to note.

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CHAPTER 5

DISCUSSION

In this study, a combination of strength training and aerobic training was more beneficial than aerobic training alone in both physical fitness and body image parameters. The greater physical improvements made by the combination training program would logically yield greater improvements in the body image variables of overall appearance evaluation, fatness evaluation, health/fitness evaluation, and negative affect. Other researchers (Skrinar, et al., 1986; Tucker and Maxwell, 1992; Koff and Bauman, 1997) have documented that changes in physical fitness are related to improvements in body image. In these studies as well as in the present study, a dose-response effect appears to exist, with greater gains in fitness being associated with greater benefits in body image.

The increase in the aerobics/strength subjects in VO_2 max indicates that improvements in aerobic capacity are not compromised when a strength component is added to the workout regimen. The success of the combination aerobics/strength program in the present study was likely due to the interval training utilized for the aerobics/strength treatment group. Elite endurance athletes have trained using intervals for years, and often attribute their success to interval training (Katch, Katch, and McArdle, 1991). Because intense exercise intervals are interspersed with rest intervals or intervals of less intense exercise, a much larger amount of work can be accomplished than with aerobic exercise that is performed continually.

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Another possible explanation for the success of the training program utilizing strength training is that resistance training produces a more salient improvement in physical fitness; that is, the greater gains in muscular strength produced better muscle tone, particularly in the arms. This change would likely be more noticeable to the participants than the gains in aerobic capacity or decreases in percent body fat. A third experimental group utilizing only strength training would have been an interesting and useful addition to this study.

The reasons for a decrease in height dissatisfaction in the aerobics/strength training group are not quite clear. Because this group improved in the areas of overall appearance evaluation, fatness evaluation, health/fitness evaluation, and negative affect, concerns regarding height may have become less important as the other improvements in body image occurred.

In health/fitness evaluation, post hoc test results indicated that the aerobics/strength training group scores were significantly higher than the aerobics group. The significant difference among group means for this variable should be interpreted with caution, because the regression slopes for the aerobics/strength training group and the aerobics group were heterogeneous. This indicates that a significant interaction exists between group membership and the covariate, pretest health/fitness evaluation. Application of the Johnson-Neyman technique (Pedhazur, 1982) revealed that all subjects with pretest health/fitness evaluation scores between 24.3 and 33.1 lie in the "region of nonsignificance"; that is, for the 17 subjects in the aerobics and aerobics/strength groups with the highest pretest health/fitness evaluation scores, the posttest means between

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groups were not significantly different, but for the 34 subjects with pretest health/fitness evaluation scores under 24.3, the posttest means between groups were significantly different.

The results of this study indicate that improvements in body image are a reflection of actual improvements in the physical fitness of the body, rather than simply being a perception of fitness improvement wherein subjects' body image improved just because they felt that they were doing something positive for their bodies. The exception to this observation is the improvement in the aerobics/strength training group in height dissatisfaction. In this case, the body image component improved although the subjects' actual height obviously did not change.

Comparison with Previous Findings

The results of this study were in agreement from other findings in recent literature, for the most part. Tucker and Maxwell (1992) found the body cathexis scores of females participating in strength training to be greater than those of a control group. This finding is consistent with the current study in that exercisers in the group which added a strength training component to their exercise regimen had significantly more positive body image scores in most of the body image subscales than controls. Tucker's examination of college men who performed strength training (1987) yielded similar results, also. In contrast, Ford, et al. (1991) studied college men and found that jogging participants improved more in body cathexis than did the weight training participants.

Skrinar, et al. (1986) found that intense aerobic training improved measures of body image. This finding is in agreement with the present study. However, in the

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previous investigation, body competence (comparable to health/fitness evaluation in the current study) correlated positively to changes in strength and endurance. In the present study, strength and endurance changes were not related to health/fitness evaluation, but were more closely related to overall appearance evaluation, fatness evaluation, and negative affect.

None of the studies mentioned in the literature to this point have involved a training program which utilized a combination of strength and endurance with regards to its impact on body image. Therefore, the comparison of results from studies involving strength training are not completely comparable to the findings in the present study. Overall, the previous findings regarding aerobic exercise and its impact on body image parameters are in agreement with the results from the aerobics training group in the present study.

The literature reviewed in this document supports the belief that a training threshold exists for improving body image. Most of the studies which were reviewed (Tucker, 1987; Ford, et al., 1991; Skrinar, et al., 1986; Tucker and Maxwell, 1992) utilized training durations of 8 to 16 weeks, with a frequency of three sessions per week. The study by Skrinar, et al. (1992) which required only 6 to 8 weeks of training yielded no improvements in body image. The sole exception to this observation is the study by Koff and Bauman (1997) in which a 6-week, 2-times-per-week training program yielded significant improvements in several components of body image. No other researchers have replicated the finding of Koff and Bauman (1997) that improvements in body image can occur with a program of this short duration and decreased frequency of training.

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Hypotheses

Nine hypotheses were proposed before the study began. The outcomes regarding these hypotheses are as follows:

1. The hypothesis that individuals participating in a combination aerobic and strength training program exhibit a more favorable overall appearance evaluation than individuals participating in aerobic training or nonexercisers was not supported. However, those participating in aerobics/strength training did have a significantly higher mean overall appearance evaluation than nonexercisers ($p<.05$).

2. The hypothesis that individuals participating in a combination aerobic and strength training program exhibit a more favorable self fatness evaluation than individuals participating in aerobic training or nonexercisers was not supported. However, those participating in aerobics/strength training did have a significantly lower mean self fatness evaluation than nonexercisers ($p<.05$).

3. The hypothesis that there is no difference in attention to grooming among individuals who do not exercise, individuals who participate in aerobic/strength training, and individuals who participate in aerobic training was not supported. Subjects participating in aerboic/strength training exhibited greater attention to grooming than nonexercisers ($p<.05$).

4. The hypothesis that individuals participating in a combination aerobic and strength training program exhibit a more favorable health/fitness evaluation than individuals participating in aerobic training or nonexercisers was not supported. However, those participating in aerobic/strength training did have significantly higher

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mean health/fitness evaluation scores than those participating in aerobics training ($p<.05$).

5. The hypothesis that individuals participating in a combination aerobic and strength training program place more importance on health/fitness than individuals participating in aerobic training or nonexercisers was not supported ($p>.05$).

6. The hypothesis that individuals participating in a combination aerobic and strength training program exhibit less social dependence in terms of comparing others' bodies to their own than individuals participating in aerobic training or nonexercisers was not supported ($p>.05$).

7. The hypothesis that there is no difference in height dissatisfaction among individuals who do not exercise, individuals who participate in aerobic/strength training, and individuals who participate in aerobic training was not supported. However, subjects who participated in aerobic/strength training had lower mean height dissatisfaction scores than those who participated in aerobic training ($p<.05$).

8. The hypothesis that individuals participating in a combination aerobic and strength training program exhibit less negative self-affect concerning their bodies than individuals participating in aerobic training or nonexercisers was not supported. However, subjects participating in aerobic/strength training had more favorable mean negative self-affect scores than nonexercisers ($p<.05$).

9. The hypothesis that there is no difference in investment in body image societal ideals among individuals who do not exercise, individuals who participate in aerobic/strength training, and individuals who participate in aerobic training was supported ($p>.05$).

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Summary of Findings

In this study, subjects who trained using a combination of aerobic and strength training had more positive body image scores than the control subjects who did not change their exercise regimen on the subscales of overall appearance evaluation, fatness evaluation, attention to grooming, and negative affect. Those trained with a combination of aerobics and strength training had more positive health/fitness self evaluation scores than those who performed aerobic exercise only. Likewise, height dissatisfaction was lower in the combination training group than in the aerobics group. Scores on the body image subscales of health/fitness influence, social dependence, and investment in societal ideals were equal among all three groups.

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CHAPTER 6

SUMMARY, RECOMMENDATIONS, AND CONCLUSION

Summary

The purpose of this study was to determine the effect of aerobic or combination aerobic/strength training exercise on body image in females. Seventy-two college-aged women volunteered for this study. Before the training programs began, all participants completed testing for percent body fat, cardiovascular endurance, upper body strength and endurance, and nine body image components assessed by the Body Self-Image Questionnaire. After the pretests, 23 subjects completed a 12-week training program of aerobic exercise training, and 28 subjects completed a 12-week training program of combined aerobic and strength training. The remaining 21 subjects did nothing to change their current exercise regimen; none of the control subjects participated in vigorous exercise training. At the end of the 12-week training programs, the researchers retested all subjects, using procedures identical to those used in the pretest.

Analysis of covariance was performed on each physical fitness variable and each component of body image in order to detect differences among the groups. ANCOVA results indicated a significant difference among the three groups in all physical fitness variables, as well as in the body image components of overall appearance evaluation, fatness evaluation, attention to grooming, health/fitness evaluation, height dissatisfaction, and negative affect. ANCOVA results revealed no significant differences among groups

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in health/fitness influence, social dependence, or investment in ideals.

Post hoc tests were performed to examine pairwise comparisons between groups. The aerobics/strength training subjects had significantly higher VO_2 max than the control group, and had significantly greater upper body strength than both the aerobics group and the control group. Aerobics/strength training subjects had significantly lower percent body fat than both the aerobics and control group subjects, and the aerobics group subjects had significantly lower percent fat than the control group subjects.

In the body image variables, pairwise comparisons showed significantly more positive attitudes in the aerobics/strength training group in overall appearance evaluation, fatness evaluation, attention to grooming, and negative self-affect. Other group means in these variables were equal. In health/fitness evaluation and height dissatisfaction, the aerobics/strength training groups showed significantly more positive attitudes than the aerobics group.

Pretest to posttest effect sizes showed that the greatest improvements occurred in the aerobics/strength training group, with the largest effect sizes for favorable gains produced in overall appearance evaluation, health/fitness evaluation, health/fitness influence, negative affect, VO_2 max, and upper body strength. The same group demonstrated a small effect size in decreased percent body fat. The aerobics group demonstrated small to medium effect sizes in improvements in health/fitness influence, negative affect, investment in societal ideals, VO_2 max, percent body fat, and upper body strength.

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Recommendations

Since body image disturbances are widespread in our society and can cause several types of physical and psychological problems for women, moderate to vigorous exercise is recommended for females. Any type of exercise is likely to improve one or more components of body image of women; however, a combination of strength training and aerobic training seems to be most beneficial in acquiring a more favorable body image. In addition to these benefits, combination training is quite effective in controlling percent body fat as well as improving VO_2 max and body strength. Thus, a combination of aerobic and strength training using moderate to vigorous exercise is recommended for females in this age group.

Further research including a group utilizing strength training only would be useful as a comparison with the aerobic/strength training regimen. A training study examining older women would also be useful in determining whether the results of this study would generalize to other age groups.

Conclusion

Exercise has a positive effect on the body image of college-aged women. Although aerobic exercise is beneficial in improving some components of body image, a combination program of aerobics and strength training elicits the most positive changes in both physical and psychological parameters.

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APPENDICES

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Appendix A

Institutional Review Board Approval

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Elementary and Special Education Department

P.O. Box 69
Middle Tennessee State University
Murfreesboro, Tennessee 37132
(615) 898-2680

To: Ruth Henry

From: Nancy Bertrand
IRB Representative

Re: "The Effects of Cardiovascular Training and Cardiavascular/Strength Training on Body Image in Adult Females"

Date: February 3, 2000

The above named human subjects research proposal has been reviewed and approved. This approval is for one year only. Should the project extend beyond one year or should you desire to change the research protocol in any way, you must submit a memo describing the proposed changes or reasons for extensions to your college's IRB representative for review.

Best of luck in the successful completion of your research.

cc: Dr. Timothy Michael

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LIPSCOMB
UNIVERSITY

DEPARTMENT OF
KINESIOLOGY

May 5, 2000

From the Institutional Review Board at Lipscomb University:

Ruth Henry received final approval from the Institutional Review Board at Lipscomb University on January 19, 2000, for her project entitled "The Effects of Cardiovascular Training and Strength Training on Body Image in Adult Females". Ms. Henry clearly outlined the data collection protocol in her proposal and included all the necessary documents to collect her data on our campus.

For the IRB,

Kent D. Johnson

Kent D. Johnson, Ph.D., FACSM
Department Chair

phone: (615) 279-5770
fax: (615) 279-6529
emailto:kent.johnson@lipscomb.edu

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Appendix B

Standardized Instructions for

Administration of Body Self-Image Questionnaire

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Body Self-Image Questionnaire

Source: Rowe, D. A. (1996).

Purpose: To measure nine separate components of body image.

Equipment: BSIQ questionnaire, pencil

Procedures: Standardized instructions for administering the questionnaire:

My name is Ruth Henry, and I am a doctoral student at MTSU. I am here today to ask for your help in providing some information for my dissertation. The following questionnaire was developed to assess your feelings about your own body.

I want to assure you that your responses will be completely anonymous. Please do not write your name on the answer sheet. After you return your answer sheet, there will be no way for anyone, including myself, to know which answer sheet came from you, and therefore nobody will ever know how you answered individually.

Secondly, there are no right or wrong answers, no good or bad answers. I have no preconceived idea of how you should respond, so please respond to each part of the questionnaire honestly; do not try to guess what I want you to put.

Finally, your participation is totally voluntary. If you decide, for whatever reason, that you do not wish to do this, you are under no obligation to do so. If you do not complete the questionnaire, I will not think badly of you. Having said that, if you do decide to participate, it will be a tremendous help to me, and I will appreciate it very much. I will now start giving out the questionnaires. If you have any questions at this point, or at any point while you are completing the questionnaire, feel free to raise your hand, and I will come and answer your question. Thank you for taking the time to help with this research.

Scoring: *(not included in instructions to participants):*
Each item is assigned to one of the BSIQ subscales. A total score is calculated for each subscale:

Appearance Evaluation = items 3 + 10 + 17 + 25 + 34 + 41
Fat Evaluation = items 7 + 14 + 21 + 26 + 30 + 37 + 44 + 48 + 50
Attention to Grooming = items 5 + 12 + 19 + 28
Health/Fitness Evaluation = items 6 + 13 + 20 + 29 + 36 + 43 + 47
Health/Fitness Influence = items 23 + 31 + 38 + 39 + 45 + 51
Social Dependence = items 8 + 15 + 22
Height Dissatisfaction = items 2 + 33 + 49
Negative Affect = items 4 + 11 + 18 + 27 + 35 + 42
Investment in Ideals = items 1 + 9 + 16 + 24 + 32 + 40 + 46

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Appendix C

Body Self-Image Questionnaire

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Body Self-Image Questionnaire - developed and validated by David A. Rowe, Ph.D.

_____ID number (last 4 digits of social security number)
_____What is your age, in years? (Please respond with your age, not date of birth)

_____To what ethnic group do you belong?

(0) African-American (1) Asian (2) Caucasian (3) Hispanic
(4) Native American (5) Pacific Islander (6) Mixed (7) Other

_____ What is your height, in total inches (not feet and inches)? Please use the conversion table below, if necessary.

4ft 7in	4ft 8in	4ft 9in	4ft 10in	4ft 11in	5ft 0in	5ft 1in	5ft 2in	5ft 3in	5ft 4in
55 in	56 in	57 in	58 in	59 in	60 in	61 in	62 in	63 in	64 in

5ft 5in	5ft 6in	5ft 7in	5ft 8in	5ft 9in	5ft 10in	5ft 11in	6ft 0in	6ft 1in	6ft 2in
65 in	66 in	67 in	68 in	69 in	70 in	71 in	72 in	73 in	74 in

_____What is your weight, in pounds?

_____What is your highest level of organized athletic participation?

(0) None
(1) Junior High School team
(2) High school team
(3) Intercollegiate or university team (not intramural or recreational team)

_____How many days a week do you exercise vigorously enough to break into a sweat? Exercise can mean any physical activity, including activities like gardening, dancing, housework - it does not have to be an organized sport, or structured fitness activity.

(0) Never (1) 1 day a week (2) 2 days a week (3) 3 days a week
(4) 4 days a week (5) 5 days a week (6) 6 days a week (7) Every day (one workout/day)
(8) Every day (more than one workout/day)

_____My body is an average weight for someone of my height and age:

(0) False (1) True

_____I have a chronic illness that influences how I feel about my body.

(0) False (1) True

Instructions for Statement 1 through Statement 51

Statements 1 through 51 are all related to you and your body. Read each statement carefully, and decide how true the statement is for you. Use the rating scale below to indicate how true the statement is for you. Pencil in the bubble for the letter which indicates your response:

Response Format (Statement 1 through Statement 51)

1) not at all true of myself 2) somewhat untrue of myself 3) neither true or untrue of myself
4) somewhat true of myself 5) completely true of myself

_____1) Controlling my level of body fat is important to me.
_____2) I've often wanted to be taller.
_____3) I think my body is unattractive.
_____4) I feel frustrated about the appearance of my naked body.
_____5) My hair looks well-groomed.
_____6) My overall fitness level is high.
_____7) My body would be better with less fat on it.

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Body Self-Image Questionnaire, continued

_____8) My thoughts about my body depend on the clothes I'm wearing.
_____9) I particularly notice how much body fat other people have.
_____10) The way my body looks in clothes makes me feel happy.
_____11) My naked body makes me feel sad.
_____12) I pay careful attention to my face and hair, so that I will look good.
_____13) My arms are lacking in muscle tone.
_____14) I think my body looks fat in clothes.
_____15) I compare my body to people I'm close to (friends, relatives, etc.).
_____16) Having a well-proportioned body is important to me.
_____17) My naked body looks O.K.
_____18) Being around good-looking people makes me feel bad about my body.
_____19) I'm usually well-dressed.
_____20) My body is healthy.
_____21) Parts of my body are fat.
_____22) I'm more aware of my body when I'm in social situations.
_____23) I watch carefully what I eat, to maintain a healthy body.
_____24) Muscle definition is important to me.
_____25) I look good in clothes.
_____26) My body is fat overall.
_____27) My naked body makes me angry.
_____28) I spend time making my appearance more attractive.
_____29) My overall muscle tone is good.
_____30) I have large buttocks.
_____31) How well my body is functioning influences the way I feel about my body.
_____32) I care about how well-shaped my legs are.
_____33) I wish I were a different height
_____34) My body looks good.
_____35) I feel depressed about my body.
_____36) My body is strong.
_____37) My body is overweight.
_____38) I feel better about my body when I'm fitter.
_____39) The way I feel about my body improves when I exercise regularly.
_____40) Body size matters to me.
_____41) My body is sexually appealing.
_____42) Most days I feel bad about my body.
_____43) I have an athletic build.
_____44) My stomach is flabby.
_____45) My body image is influenced by the state of my health.
_____46) I notice what weight other people are.
_____47) My body is in shape.
_____48) My hips are very wide.
_____49) If I were a different height, I'd like my body better.
_____50) I wish I were thinner.
_____51) I exercise regularly, to keep my body in shape.

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Appendix D

Written Instructions for

Physical Fitness Tests

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Instructions for Fitness Testing

Name_____

Your appointment time is_____on_____

Please report to the Exercise Science lab (Room 206 in the Student Activity Center).

Before your fitness tests, please follow these instructions:

- Do not eat a big meal within 3 hours of your fitness test.
- Do not smoke or consume caffeine on the day of your fitness test.
- Do not exercise on the day of your test. This includes running to the lab because you're in a hurry! ☺ Please allow plenty of time.
- Please wear shorts and a short-sleeved t-shirt for your fitness test. Do NOT wear tights under your shorts!
- Please be on time to your appointment. If you're late, the people who are scheduled after you will have to wait. Be considerate!

Thanks for helping with this study!!

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Appendix E

Physical Fitness Test Protocols

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Submaximal Bench Press Protocol

Source: The Y's Way to Fitness. (1991). Golding, J.A., Myers, C. R., and Sinning, W. E. Chicago, IL: National Board of the YMCA.

Purpose: To measure upper body (triceps, anterior deltoid, and pectoralis major) muscular endurance.

Equipment: 35 lb. barbell (women)
80 lb. barbell (men)
Metronome set for 60 clicks per minute
Flat bench press

Procedures: 1. The participant should lie on the bench in a supine position. The knees should be bent so as to keep the low spine pressed flat to the bench. Feet should be flat on the floor (or on box or bench if legs are short).

2. The spotter should hand the barbell to the participant who flexes his/her arms bringing the barbell to the down position. Palms are up gripping the bar shoulder width apart.

3. After each extension, the barbell is returned to the down position. The rhythm is kept by the metronome, each click representing a movement up or down (60 clicks per minute = 30 complete lifts (up and down) per minute.

Scoring: The test is scored as the number of successful repetitions. The test should be considered terminated when the participant is unable to reach full extension of the elbows or breaks cadence and cannot keep up with the rhythm of the metronome.

CAUTION: The participant should not invoke the Valsalva maneuver and should breathe easily during the exercise.

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The Queens College Step Test

Source: Katch, W. D., Katch, F. I., & McArdle, V. L. (1991). Exercise Physiology: Energy Nutrition, and Human Performance. Philadelphia, PA: Lea & Febiger.

Purpose: To estimate maximal aerobic capacity (VO_2 max).

Equipment: 16¼" bench
Metronome set for 88 clicks per minute (women)
Stopwatch
Heart rate monitor

Procedures: 1. The subject is instructed on test protocol, and is equipped with a heart rate monitor.

2. The subject begins stepping at 22 complete step cycles per minute. After 15 seconds of practice, the subject continues stepping as the stopwatch is started. Subjects are coached and encouraged to keep the proper stepping cadence during the 3-minute test.

3. After 3 minutes have elapsed, the subject stops stepping and stands still; at 15 seconds post-exercise, the heart rate is taken.

Scoring: The score is the heart rate after 15 seconds of recovery. This heart rate is entered into the following equation to predict VO_2 max:

VO_2 max = 65.81 - (0.1847 x post-exercise heart rate)

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Appendix F

Physical Activity Readiness Questionnaire

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Physical Activity Readiness Questionnaire - PAR-Q (revised 1994)

PAR - Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

YES	NO		
☐	☐	1.	Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?
☐	☐	2.	Do you feel pain in your chest when you do physical activity?
☐	☐	3.	In the past month, have you had chest pain when you were not doing physical activity?
☐	☐	4.	Do you lose your balance because of dizziness or do you ever lose consciousness?
☐	☐	5.	Do you have a bone or joint problem that could be made worse by a change in your physical activity?
☐	☐	6.	Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
☐	☐	7.	Do you know of any other reason why you should not do physical activity?

If you answered

YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want — as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programs are safe and helpful for you.

NO to all questions

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:

- start becoming much more physically active – begin slowly and build up gradually. This is the safest and easiest way to go.
- take part in a fitness appraisal — this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively.

DELAY BECOMING MUCH MORE ACTIVE:

- if you are not feeling well because of a temporary illness such as a cold or a fever — wait until you feel better; or
- if you are or may be pregnant — talk to your doctor before you start becoming more active.

[redacted]

Informed Use of the PAR-Q: The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

You are encouraged to copy the PAR-Q but only if you use the entire form

NOTE: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

I have read, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction.

NAME _____

SIGNATURE _____ DATE _____

SIGNATURE OF PARENT or GUARDIAN (for participants under the age of majority) _____ WITNESS _____

continued on other side...

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Appendix G

Informed Consent

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Informed Consent

(Adapted from ACSM's Guidelines for Exercise Testing and Prescription, 5th Ed.)

1. Explanation of the Test/Training Program
You will perform an exercise test on a step bench. The exercise test will consist of 3 minute of stepping on a 16-inch bench at a moderate rate of 22 step cycles per minute. We may stop the test at any time because of signs of fatigue or discomfort. You will have skinfold measurements taken for assessment of body composition, and your height and weight will be measured. You will also complete a questionnaire concerning thoughts and attitudes about your body self-image. You will then complete 12 weeks of a 3-times-per-week training program, geared toward either cardiovascular fitness or a combination of cardiovascular/muscular fitness. Control group subjects will not participate in the training program. The fitness tests will be repeated at the conclusion of the 12 weeks.

2. Risks and Discomforts
There exists the possibility of certain changes occurring during the test. They include abnormal blood pressure, fainting, irregular, fast, or slow heart rhythm, and in rare instances, heart attack, stroke, or death. Every effort will be made to minimize these risks by evaluation of preliminary information relating to your health and fitness and by observations during testing. Emergency phone numbers are posted to summon emergency personnel in the event that an unusual situation should arise.

3. Responsibilities of the Participant
Information you possess about your health status or previous experiences of unusual feelings with physical effort may affect the safety and value of your exercise test. Your prompt reporting of feelings with effort during the exercise test itself are also of great importance. You are responsible to fully disclose such information when requested by the testing itself.

4. Benefits to be Expected
The results obtained from the exercise test may assist in the diagnosis of illness or in evaluating what type of physical activities you might do with low risk of harm. The training program will likely help you to increase your level of physical fitness.

5. Inquiries and Confidentiality
Any questions about the procedures used in the exercise test or the test results are encouraged. If you have any doubts or questions, please ask us for further explanations. All information from this test will be kept confidential, and records will be stored in a password-protected file; the identity of your responses to body image questions will be coded so that even the researcher does not know the identity of the respondents.

6. Freedom of Consent
Your permission to perform this exercise test is voluntary. You are free to deny consent or stop the test at any point, if you so desire.

I have read this form and I understand the test procedures that I will perform and the attendant risks and discomforts. Knowing these risks and discomforts, and having had an opportunity to ask questions that have been answered to my satisfaction, I consent to participate in this program.

Date	Signature of Subject
Date	Signature of Test Administrator
Date	Signature of Witness

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Appendix H

Analysis of Variance for

Pretest Scores

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ANOVA for Pretest Scores
Body Image and Physical Fitness Variables

	F	p
Physical Fitness Variables		
Percent Body Fat	.251	.779
Number of Bench Press Repetitions	1.203	.307
VO_2 Max	.787	.459
Body Image Variables		
Overall Appearance Evaluation	.968	.385
Fatness Evaluation	2.189	.120
Attention to Grooming	.221	.802
Health/Fitness Evaluation	1.566	.216
Health/Fitness Influence	.127	.881
Social Dependence	1.975	.147
Height Dissatisfaction	1.544	.221
Negative Affect	3.115	.052
Investment in Ideals	1.873	.161

$F_{\text{critical value } (.05/2,69)} = 3.14$

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Appendix I

Correlations Between Change Scores

Physical Fitness and Body Image Variables

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Correlations Between Change Scores for Physical Fitness and Body Image Variables

	% Fat	Bench	VO_2 max	OAE	FE	AG
% Fat	1.000	-.125	-.312**	-.314**	.129	-.219
Bench	-.125	1.000	.108	.199	-.204	.306*
VO_2 max	-.312**	.108	1.000	.109	-.245*	.131
OAE	-.314**	.199	.109	1.000	-.544**	.115
FE	.129	-.204	-.245*	-.544**	1.000	.075
AG	-.219	.306*	.131	.115	.075	1.000
HFE	-.090	.073	-.068	.126	.296*	-.150*
HFI	-.252	.013	.145	.122	.083	.298*
SD	-.044	-.133	-.115	.138	-.137	.363**
HD	-.076	-.072	.044	-.098	.143	.226
NA	.153	-.404**	-.144	.577**	.591**	-.096
II	-.097	.022	.088	-.054	.307**	.274*

% Fat = percent body fat; Bench = bench press repetitions; OAE = overall appearance evaluation; FE = fatness evaluation; AG = attention to grooming; HFE = health/fitness evaluation; HFI = health/fitness influence; SD = social dependence; HD = height dissatisfaction; NA = negative affect; II = investment in ideals.

** Correlation is significant at the .01 level.
* Correlation is significant at the .05 level.

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Correlations Between Change Scores for Physical Fitness and Body Image Variables (continued)

	HFE	HFI	SD	HD	NA	II
% Fat	-.090	-.252*	-.044	-.076	.153	-.097
Bench	.073	.013	-.133	-.072	-.404**	.022
VO_2 Max	-.068	.145	-.115	.044	-.144	.088
OAE	.296*	.122	-.137	-.098	-.577**	.054
FE	-.150	.083	.363**	.142	.591**	.307**
AG	.038	.298*	.125	.226	-.096	.274**
HFE	1.000	.108	-.206	-.073	-.190	.042
HFI	.108	1.000	.096	.090	-.032	.304**
SD	-.206	.096	1.000	.204	.337**	.244**
HD	-.073	.090	.204	1.000	.088	.243*
NA	-.190	-.032	.337**	.088	1.000	.189
II	.042	.304**	.244*	.243*	.189	1.000

% Fat = percent body fat; Bench = bench press repetitions; OAE = overall appearance evaluation; FE = fatness evaluation; AG = attention to grooming; HFE = health/fitness evaluation; HFI = health/fitness influence; SD = social dependence; HD = height dissatisfaction; NA = negative affect; II = investment in ideals.

** Correlation is significant at the .01 level.
* Correlation is significant at the .05 level.

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Appendix J

Individual Raw Data

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Individual Raw Data - Physical Fitness Variables
Aerobics Group

I.D.#	Body Fat (%)		VO_2 max ($ml \cdot kg^{-1} \cdot min^{-1}$)		Bench Press (# of reps)	
	T_1	T_2	T_1	T_2	T_1	T_2
01	17.6	17.3	31.09	---	12	---
02	20.4	23.5	41.24	41.43	35	37
03	24.2	22.9	33.67	37.92	20	25
04	19.4	18.4	36.26	37.74	18	16
05	32.9	28.4	33.12	36.26	---	---
06	23.6	23.0	28.87	32.01	30	39
07	24.8	23.9	35.89	37.18	26	27
08	16.4	14.2	38.29	41.80	13	18
09	35.5	33.8	31.46	31.09	19	20
10	29.2	28.4	37.00	35.33	23	32
11	39.5	35.8	36.44	38.66	39	42
12	18.7	18.4	34.04	34.97	25	39
13	18.4	16.7	43.65	36.07	24	44
14	30.8	20.5	31.64	32.38	7	7
15	21.5	20.8	31.64	35.70	9	12
16	22.5	23.2	32.56	33.49	14	13
17	22.2	21.3	37.00	40.32	36	34
18	31.6	26.0	36.63	34.41	31	26
19	20.9	13.7	38.84	40.88	8	20
20	19.8	17.2	32.01	35.89	9	17
21	17.6	17.3	34.23	33.49	20	16
22	20.5	19.9	37.00	35.89	22	29
23	21.2	20.5	50.11	50.30	18	33
Mean	23.5	22.1	35.77	36.10	21.4	26.0
Stan. Dev.	6.7	5.6	4.69	4.22	9.2	10.8

T_1 = pretest; T_2 = posttest

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Individual Raw Data - Physical Fitness Variables

Aerobics/strength Group

I.D.#	Body Fat (%)		VO_2 max ($ml \cdot kg^{-1} \cdot min^{-1}$)		Bench Press (# of reps)	
	T_1	T_2	T_1	T_2	T_1	T_2
24	18.7	15.2	35.52	39.21	28	34
25	23.7	21.8	37.00	39.40	35	52
26	15.5	13.3	36.63	38.29	44	50
27	25.7	22.2	31.46	37.74	18	25
28	17.3	15.9	33.86	35.33	23	30
29	20.4	18.0	37.92	41.06	29	42
30	24.4	20.1	33.12	35.70	7	21
31	19.1	17.0	35.33	34.23	26	37
32	29.7	27.0	30.72	34.41	9	21
33	24.7	23.8	34.41	39.03	6	17
34	24.7	22.2	29.79	31.64	28	30
35	36.3	34.0	36.26	35.70	22	22
36	21.8	18.1	39.03	39.21	35	49
37	29.0	23.8	35.15	37.00	20	29
38	18.3	15.2	32.56	33.67	16	28
39	23.2	21.6	42.91	46.79	11	19
40	19.7	16.9	31.64	34.23	28	29
41	23.9	21.6	39.95	41.43	24	41
42	20.7	18.4	32.38	38.29	33	46
43	18.4	17.0	34.23	36.07	21	28
44	21.5	17.4	36.44	38.47	38	34
45	22.5	21.2	37.74	38.66	18	38
46	13.0	11.5	35.33	39.03	16	31
47	27.8	25.7	32.19	36.44	18	29
48	28.9	25.6	35.33	37.00	29	46

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Individual Raw Data - Physical Fitness Variables
Aerobics/strength Group, cont.

I.D.#	Body Fat (%)		VO_2 max ($ml \cdot kg^{-1} \cdot min^{-1}$)		Bench Press (# of reps)	
	T_1	T_2	T_1	T_2	T_1	T_2
49	29.8	19.4	35.15	39.40	26	29
50	21.4	19.4	36.26	34.23	24	27
51	24.4	21.8	34.97	35.52	47	54
Mean	23.0	20.2	35.12	37.4	24.3	33.5
Stan. Dev.	5.0	4.7	2.9	3.0	10.2	10.5

T_1 = pretest; T_2 = posttest

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Individual Raw Data - Physical Fitness Variables
Control Group

I.D.#	Body Fat (%)		VO_2 max ($ml \cdot kg^{-1} \cdot min^{-1}$)		Bench Press (# of reps)	
	T_1	T_2	T_1	T_2	T_1	T_2
52	35.2	35.2	30.16	31.46	15	14
53	15.2	15.2	31.27	31.83	13	15
54	25.4	24.4	37.00	35.70	26	25
55	18.6	20.0	36.26	38.29	43	51
56	25.2	25.2	35.70	36.44	43	50
57	25.0	24.8	35.33	38.29	31	32
58	20.1	21.8	33.30	32.56	17	19
59	17.0	18.8	38.84	36.81	24	24
60	10.8	13.5	37.00	33.67	18	20
61	15.4	16.1	38.47	37.37	25	25
62	23.8	22.5	37.37	39.21	46	40
63	21.9	22.9	42.35	41.43	30	30
64	18.7	21.4	33.67	34.04	13	14
65	29.3	26.9	33.49	33.30	26	22
66	25.4	25.8	32.01	34.04	24	18
67	33.9	34.0	33.30	------	22	---
68	28.2	27.7	39.40	37.92	33	35
69	22.2	24.9	42.91	34.04	21	28
70	17.9	20.0	37.18	39.21	34	34
71	17.7	17.4	43.09	41.43	13	14
72	21.1	21.8	37.92	38.11	30	32
Mean	22.3	22.9	36.47	36.26	26.1	27.1
Stan. Dev.	6.1	5.5	3.7	3.0	9.9	11.1

T_1 = pretest; T_2 = posttest

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Individual Raw Data - Body Image Variables
Aerobics Group

ID#	OAE		FE		AG		HFE		HFI	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
01	27	26	23	26	17	17	28	29	29	29
02	22	18	32	36	16	13	28	26	26	25
03	19	19	31	29	12	13	16	21	19	25
04	18	21	35	33	18	17	23	23	26	26
05	8	13	41	39	17	16	26	26	27	27
06	15	16	37	34	20	18	23	18	21	22
07	21	19	34	42	16	17	29	31	25	23
08	26	27	16	17	17	18	28	24	27	27
09	16	21	38	38	15	11	20	17	20	25
10	16	19	34	31	18	18	26	26	20	26
11	19	22	42	38	19	18	30	32	27	29
12	16	17	25	28	19	19	24	23	27	25
13	16	12	31	34	13	13	30	27	22	24
14	16	18	35	36	15	18	18	16	22	25
15	21	22	31	30	17	18	18	17	23	25
16	25	24	26	19	16	18	20	22	21	26
17	24	25	23	18	10	13	29	28	23	25
18	6	6	45	45	16	19	24	23	30	30
19	26	29	11	14	14	17	34	32	21	26
20	22	21	27	24	18	16	18	15	18	18
21	28	20	26	25	18	13	22	23	20	14
22	19	21	31	30	19	19	26	28	27	28
23	26	30	14	9	16	19	29	35	27	25
Mean	19.6	20.3	29.9	29.4	16.4	16.4	24.7	24.4	23.8	25.0
Stan. Dev.	5.7	5.5	8.7	9.3	2.4	2.5	4.8	5.5	3.5	3.5

OAE = overall appearance evaluation
FE = fatness evaluation
AG = attention to grooming
HFE = Health/Fitness Evaluation
HFI = Health/Fitness Influence
T_1 = pre-test; T_2 = post-test

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Individual Raw Data - Body Image Variables

Aerobics Group

ID#	SD		HD		NA		II	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
01	12	12	6	5	6	7	32	32
02	14	14	12	12	26	29	35	34
03	10	10	8	5	22	14	24	21
04	13	12	3	3	24	17	33	32
05	13	12	12	6	24	24	30	31
06	11	11	5	6	20	14	33	32
07	13	14	13	15	20	20	31	32
08	12	10	6	8	10	9	30	29
09	10	12	3	3	21	22	24	25
10	13	13	12	12	27	19	32	30
11	15	15	10	8	22	23	33	31
12	12	12	13	12	29	23	33	29
13	13	12	7	7	23	22	32	30
14	10	10	3	10	19	22	29	29
15	12	15	11	12	20	10	34	35
16	10	11	5	8	10	11	19	19
17	12	11	3	3	11	8	25	24
18	13	14	15	15	30	30	35	35
19	9	5	15	15	8	8	23	22
20	12	10	8	10	16	16	32	29
21	6	6	3	3	9	12	27	17
22	11	13	6	7	15	14	31	32
23	7	9	13	11	6	6	26	29
Mean	11.4	11.4	8.4	8.5	18.2	16.5	29.7	28.7
Stan. Dev.	2.1	2.5	4.2	4.0	7.4	7.1	4.3	5.0

SD = social dependence
HD = height dissatisfaction
NA = negative affect
II = investment in ideals
T_1 = pre-test; T_2 = post-test

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Individual Raw Data - Body Image Variables
Aerobics/strength Group

ID#	OAE		FE		AG		HFE		HFI	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
24	20	27	28	30	14	17	21	18	21	20
25	7	8	45	44	17	14	24	21	23	24
26	21	27	15	10	15	17	28	31	25	29
27	21	20	33	34	15	16	23	22	19	24
28	19	23	11	11	11	10	15	26	20	20
29	23	25	26	21	20	19	32	33	30	30
30	16	22	32	29	17	18	20	20	26	27
31	13	25	35	28	12	12	11	33	22	24
32	20	24	28	26	18	17	16	23	21	22
33	24	25	21	16	14	16	21	21	20	25
34	27	25	31	28	16	16	24	33	19	24
35	10	20	44	36	18	17	21	20	20	24
36	26	25	15	15	17	20	25	31	25	26
37	12	15	39	37	15	15	19	23	24	26
38	22	24	36	34	16	19	16	21	25	25
39	23	23	21	21	15	16	29	30	29	29
40	16	19	41	35	19	18	22	26	20	24
41	20	20	29	20	17	17	27	25	23	24
42	19	22	25	14	16	15	27	29	25	25
43	19	23	26	18	16	17	28	31	22	20
44	14	15	30	36	15	15	18	19	23	28
45	15	18	30	27	14	16	24	24	25	24
46	28	28	9	9	13	15	28	31	17	18
47	20	20	32	27	18	17	19	19	27	26
48	11	16	42	42	16	18	22	29	24	28
49	17	23	35	31	20	17	25	25	25	26

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Individual Raw Data - Body Image Variables
Aerobics/strength Group, cont.

ID#	AE		FE		AG		HFE		HFI	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
50	25	23	25	26	18	18	24	25	28	29
51	22	25	34	40	13	12	20	29	24	28
Mean	18.9	21.5	29.2	26.6	15.9	16.2	22.3	25.7	23.3	25.0
Stan. Dev.	5.3	4.5	9.4	9.9	2.3	2.2	4.9	4.8	3.2	3.0

OAE = overall appearance evaluation
FE = fatness evaluation
AG = attention to grooming
HFE = Health/Fitness Evaluation
HFI = Health/Fitness Influence
T_1 = pre-test; T_2 = post-test

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Individual Raw Data - Body Image Variables

Aerobics/strength Group

ID#	SD		HD		NA		II	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
24	8	13	3	3	15	14	22	18
25	12	13	11	10	30	25	33	33
26	11	8	3	3	11	6	26	30
27	9	10	6	3	20	24	22	22
28	10	9	3	3	6	7	21	19
29	13	12	3	3	21	13	33	34
30	11	11	3	4	24	11	34	32
31	15	14	3	4	21	11	29	30
32	11	9	6	6	14	12	22	26
33	10	9	3	3	10	7	19	23
34	12	13	3	3	14	13	21	24
35	14	11	11	5	30	21	35	30
36	15	14	3	3	10	8	32	33
37	15	9	13	13	29	35	30	27
38	10	9	7	8	24	19	32	30
39	9	13	12	11	13	15	34	34
40	8	12	11	9	20	21	32	31
41	12	15	3	3	18	14	33	30
42	12	8	5	3	19	11	30	26
43	11	9	11	7	15	8	23	22
44	13	12	14	14	17	21	25	31
45	11	12	7	7	15	13	25	26
46	10	6	3	4	7	6	22	22
47	14	11	7	7	25	19	35	31
48	13	7	10	7	26	19	25	26
49	9	13	9	8	19	16	34	31

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Individual Raw Data - Body Image Variables
Aerobics/strength Group, cont.

ID#	SD		HD		NA		II	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
50	13	8	12	6	9	6	25	20
51	9	8	8	6	20	15	28	26
Mean	11.4	10.8	6.9	5.9	17.9	14.3	27.9	27.4
Stan.Dev.	2.1	2.4	3.8	3.2	6.8	6.0	5.2	4.7

SD = social dependence HD = height dissatisfaction NA = negative affect
II - investment in ideals
T_1 = pre-test; T_2 = post-test

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Individual Raw Data - Body Image Variables
Control Group

ID#	OAE		FE		AG		HFE		HFI	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
52	20	22	33	31	16	13	15	17	21	21
53	20	19	10	12	11	10	10	11	10	15
54	18	18	32	34	18	19	27	28	24	23
55	25	25	24	24	19	20	30	32	29	27
56	16	16	37	37	17	17	25	27	28	28
57	20	20	42	41	17	16	23	20	27	26
58	28	16	19	37	19	17	28	27	28	28
59	16	19	22	16	14	12	22	19	16	18
60	20	22	12	19	15	16	23	23	21	24
61	22	21	16	12	17	12	26	29	23	22
62	24	23	22	26	17	15	29	34	29	28
63	25	25	16	18	15	16	25	28	24	25
64	21	25	23	19	19	16	28	29	25	21
65	27	25	27	38	14	15	23	27	15	21
66	24	22	16	11	13	9	24	21	25	23
67	19	17	22	30	10	12	22	11	16	19
68	17	21	36	33	20	17	29	29	24	20
69	11	13	39	38	15	14	18	18	28	24
70	30	28	11	9	16	18	30	34	28	28
71	14	17	39	42	20	17	22	32	24	26
72	25	26	16	12	17	16	20	23	26	27
Mean	21.1	21.0	24.5	25.7	16.1	15.1	23.8	24.7	23.4	23.5
Stan. Dev.	4.8	3.9	10.1	11.3	2.7	2.9	5.1	6.8	5.2	3.7

OAE = overall appearance evaluation
FE = fatness evaluation
AG = attention to grooming
HFE = Health/Fitness Evaluation
HFI = Health/Fitness Influence
T_1 = pretest; T_2 = posttest

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Individual Raw Data - Body Image Variables
Control Group

ID#	SD		HD		NA		II	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
52	7	5	3	3	9	14	15	17
53	3	5	3	4	8	6	13	9
54	11	12	13	13	19	20	29	30
55	13	12	3	3	15	14	33	33
56	15	15	3	3	22	22	33	33
57	15	14	3	3	27	26	33	34
58	10	15	6	3	6	22	32	33
59	10	7	6	3	9	6	23	15
60	5	10	8	9	8	10	19	22
61	8	5	10	8	6	12	25	17
62	11	6	4	3	11	11	33	32
63	9	11	7	7	9	12	26	28
64	14	11	4	4	14	6	28	25
65	10	13	5	8	9	14	19	25
66	3	3	3	3	9	8	19	22
67	3	5	6	6	6	10	17	20
68	14	12	15	12	20	19	32	32
69	11	13	5	3	26	22	35	32
70	10	10	3	3	6	8	31	21
71	15	15	15	15	30	29	32	34
72	13	10	8	10	10	6	31	30
Mean	10.0	10.1	6.3	6.0	13.3	14.1	26.4	25.9
Stan.Dev.	4.0	3.7	3.9	3.9	7.6	7.1	7.2	7.4

SD = social dependence
HD = height dissatisfaction
NA = negative affect
II = investment in societal ideals
T_1 = pretest; T_2 = posttest

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