SOCIAL PHYSIQUE ANXIETY, BODY-SIZE DISSATISFACTION, AND RESTRAINED EATING AMONG NON-EXERCISING, RECREATIONALLY EXERCISING, AND COMPETITIVELY EXERCISING WOMEN

by

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ABSTRACT

Objectification theory states that in the socio-cultural context of North America women feel much pressure to have a thin, fit, ideal body. It is hypothesized that exercise, food attitudes, and women's feelings about their bodies are linked. Also, doubts have been raised about whether exercise is associated with positive well-being for women in North America. The primary purpose of this study was to determine whether exercise was associated with food attitudes and women's feelings about their bodies. The secondary purpose was to investigate whether women who exercised competitively differed from women who exercised recreationally in food attitudes and feelings about their bodies. This was investigated as much of the exercise literature is based on samples of competitive athletes, and it is unknown how representative these women are of the majority of women who exercise recreationally. A third purpose was to investigate whether food attitudes were associated with women's feelings about their bodies.

The Three Factor Eating Questionnaire (TFEQ) measured food attitudes, namely dietary restraint, disinhibition of dietary restraint, and susceptibility to hunger. Participants' feelings about their bodies were measured by the Social Physique Anxiety Scale (measured social physique anxiety), the Contour Drawing Rating Scale (measured body-size dissatisfaction), and a question regarding individuals' concern with differences between their current and ideal body sizes. The Godin Leisure Time Exercise Questionnaire measured habitual exercise activity.

A convenience sample of 52 competitive, 61 recreational, and 53 non-exercising female UBC students, mean age 21.7 ± 3.6 years, completed questionnaires. No difference existed amongst the groups for body-size dissatisfaction. Competitive exercisers had more positive feelings about their bodies than recreational and non-exercisers, and less dietary restraint than recreational exercisers. Recreational exercisers did not have more positive feelings about their bodies than non-exercisers, and reported more dietary restraint. Each exercise group had individual patterns of interrelationships amongst exercise, food attitudes, and feelings about their bodies. Therefore, the results only partially supported objectification theory because while exercise, food attitudes, and women's feelings about their bodies were linked, their relationships were complex and variable depending on a woman's exercise habits.

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CHAPTER I

INTRODUCTION

1. Background and Study Rationale

Objectification theory states that in North America, the female body is reduced to a thing, an object for others' consumption (Fredrickson & Roberts, 1997). This reduction, it is hypothesized, impacts how women experience their bodies (Fredrickson & Roberts, 1997). They experience their bodies from the point of view of an observer, a consumer who evaluates how well their body compares to a cultural ideal (Fredrickson & Roberts, 1997). Unfortunately, women will almost never match their body to their goal because their goal is an ideal. An ideal, by definition is unattainable as it is the perfection that only exists in the mind.

The cultural pressure to conform to an ideal affects an individual's body image (Bordo, 1993). Body image is the cognitions and feelings that an individual has about his/her own body (Scully, Kremer, Meade, Graham, & Dudgeon, 1998). Body image plays an important role in the psychosocial health of women (McKinley & Hyde, 1996). A similar construct to body image is social physique anxiety (SPA). These two constructs are similar in that they both consist of feelings and cognitions about an individual's own body. However, SPA is more specific than body image; it is the anxiety that an individual experiences from the belief that others are observing and negatively evaluating his/her physique (Hart, Leary, & Rejeski, 1989). Physique is defined as the form and structure of the body, especially body fat, muscle tone, and proportions (Hart et al., 1989). An important aspect of SPA is that the observation and negative evaluation by others may be real or imagined by the individual (Hart et al.,

1989). In other words, it is the individual's perception of being observed and evaluated that leads to his/her anxiety.

The North American ideal for women's bodies is thin and fit (Bordo, 1993). Exercise can be used in an attempt to improve the bodies of women who share negative experiences of their bodies. Evidence for this practice exists in the exercise motivation research as women report being motivated for exercise primarily by body-appearance related factors such as weight loss and "toning" (Frederick, Morrison, & Manning,1996; Frederick & Ryan, 1993; Hsu, 1989; Lindeman, 1999, Scully et al., 1998). The relationship between exercise and body image, however, is unclear. Studies have found that exercise is associated with both better and poorer body image (Davis & Fox, 1993). SPA is associated with exercise. Studies support that it is associated with type and frequency of exercise activity, motivation for exercise, and enjoyment of exercise (Crawford & Eklund, 1994; Eklund & Crawford, 1994; Finkenberg, DiNucci, McCune, Chenette, & McCoy 1998; Frederick & Morrison, 1996; McAuley, Bane, & Mihalko, 1995; Spink, 1992).

Women can also combine exercise with other unhealthy behaviours aimed at body control, such as restrained eating (French & Jeffrey, 1994; Lindeman, 1999; Story, Neumark-Sztainer, Sherwood, Stang, & Murray, 1998). In fact, exercise and restrained eating are hypothesized to be mutual catalysts (Davis, 1990; Davis & Fox, 1993; Davis, Kennedy, Ravelski, & Dionne, 1994). Restrained eating, defined as the tendency to consciously attempt to restrict dietary intake in order to meet self-imposed or socially imposed weight ranges, plays a significant part in weight manipulation and eating

disorders (Gorman & Allison, 1995). Restrained eating may have negative physiological and psychosocial impacts on individuals without clinical eating disorders.

Physical activity is proven to positively impact health in the reduction of diseases such as cardiovascular disease, hypertension, and diabetes (Burnham, 1998; Health Canada & Canadian Society for Exercise Physiology, 1998; Pate, et al., 1995; Scully et al., 1998; U.S. Department of Health and Human Services, 1996). However, the socio-cultural context of North America may intercept the positive influence of physical activity on health for some women and cause exercise to be associated with harmful behaviours and poorer health and well-being. Ever since the dramatic reduction of infectious diseases, health has encompassed more than simply the absence of diseases (Epp, 1986). Health is now defined as "a state of complete physical, mental, and social well-being" (Epp, 1986, p4). Health can be influenced by many factors including culture, socio-economic status, and environment (Epp, 1986). Therefore, when investigating the health of women, one must consider not only physiological status but also the larger picture including psychosocial health.

Objectification theory helps to explain why exercise, while having an undeniable positive impact on certain diseases, may be associated with poor well-being for some women. It is important for those promoting exercise, such as health and fitness professionals, to be knowledgeable about their target audience and clientele, as well as the possible consequences of exercise participation. "This is particularly important in order to avoid a concomitant increase in weight anxiety and restrained eating with an increase in the number of campaigns aimed at increasing exercise levels" (McElhone, Kearney, Giachetti, Zunft, & Martinez, 1999, p.143). If women are combining exercise

with potentially harmful eating behaviours and/or if exercise is associated with poor body image and high social physique anxiety, then health professionals cannot confidently recommend exercise for the promotion of health for all populations. The study proposed herein, while not able to determine causality due to its cross-sectional nature, will investigate whether exercise is associated, positively or negatively, with three constructs which have health implications, namely restrained eating, body image, and social physique anxiety, in a substantial group of female university students. Also, this study will help to determine whether female exercisers can be treated as a whole or whether competitive female exercisers differ from recreational athletes in regards to these three constructs. The relationships investigated in the present study are depicted in the diagram in Appendix 1.

2. Research Questions

Several research questions are investigated.

i. Primary Question:

Is exercise associated with the potentially harmful constructs of restrained eating, social physique anxiety, and body-size dissatisfaction among women?

ii. Secondary Questions:

1) Does participation in competitive exercise affect any association between exercise and restrained eating, social physique anxiety and/or body-size dissatisfaction for women?
2) Does there exist, among women, an association between social physique anxiety and restrained eating?
3) Does there exist, among women, an association between social physique anxiety and body-size dissatisfaction?
4) Does there exist, among women, an association between restrained eating and body-size dissatisfaction?

3. Null Hypotheses

To address the research questions, six null hypotheses are tested by this study.

1) There will be no difference in cognitive dietary restraint, disinhibition of eating or susceptibility to hunger as measured by the Three Factor Eating Questionnaire (TFEQ) among non-exercising, recreationally exercising and competitively exercising women.
2) There will be no difference in social physique anxiety as measured by the Social Physique Anxiety Scale (SPAS) among non-exercising, recreationally exercising and competitively exercising women.
3) There will be no difference in body-size dissatisfaction as measured by the Contour Drawing Rating Scale among non-exercising, recreationally exercising and competitively exercising women.
4) There will be no correlation between social physique anxiety as measured by the SPAS and cognitive dietary restraint, disinhibition of eating or susceptibility to hunger as measured by the TFEQ.
5) There will be no correlation between social physique anxiety as measured by the SPAS and body-size dissatisfaction as measured by the Contour Drawing Rating Scale
6) There will be no correlation between body-size dissatisfaction as measured by the Contour Drawing Rating Scale and cognitive dietary restraint, disinhibition of eating or susceptibility to hunger as measured by the TFEQ.

4. Unique Aspects of the Study

The present study helps to answer the many calls in the literature for investigations to help explore the relationships among exercise, eating behaviour, and women's experiences with their bodies. For example, Davis and Fox (1993) state that "clearly there is a pressing need for a better understanding of the associations between exercise, body image, and disordered eating, not only because of the methodological deficiencies of previous research, but because of the social relevance and the timeliness of these issues" (p.202). In addition, Frederick and colleagues stated that: "knowledge gained about exercise participation and its effect on health can be used to promote exercise among those who could benefit from exercise, while identifying those individuals for whom exercise may be unhealthy" (Frederick et al., 1996, p.691).

Several aspects of this study lead to its unique contribution to the literature. The importance and role of exercise in meeting socially imposed body ideals may differ among women who participate at different levels of exercise, as suggested by research into exercise motivation. However, often studies only include either recreational or competitive exercisers; therefore, study results are difficult to generalize to all exercising women. This study investigates the differences between recreationally and competitively exercising women's body experiences (i.e. social physique anxiety and body-size dissatisfaction) and food attitudes (i.e. restrained eating, disinhibition of restraint, and susceptibility to hunger). This has not been previously examined. Including both competitive and recreational exercisers follows recommendations like that from Thompson (1990) who stated that investigations into the effect of exercise on body image should keep recreational exercisers separate from competitive athletes. Also a

non-exercising group of female students was included in the present study to allow comparison with recreationally and competitively exercising women. This inclusion of a non-exercising comparison group was recommended by Harris (2000) in order to compare non-exercisers' results with those of women who do exercise.

A second unique aspect of this study is the inclusion of the measurement of social physique anxiety. Social physique anxiety, while having been studied in association with clinically diagnosed eating disorders, has not previously been investigated in association with restrained eating in a non-clinical adult population. Social physique anxiety has been found to be associated with exercise; however, exercise, social physique anxiety, and eating behaviour have not previously been combined in an investigation. The present study contributes to filling this gap in the literature. Also, the use of both body-size dissatisfaction and social physique anxiety fulfils the recommendation of Williams and Cash (2001). These authors believe that the use of more than one measure of body experience is important for understanding the impact of exercise, as women's experiences of their bodies are complex and the use of only one measure may not fully capture any interaction between exercise and body experience.

CHAPTER II

LITERATURE REVIEW

1. Introduction

This literature review begins with a brief overview of the socio-cultural context of North American women's lives. Objectification theory is used to explain how this context affects the relationships among women's experiences of their bodies, food attitudes, and exercise. With the foundation laid for the combined investigation of body experiences, food attitudes, and exercise, literature related to each component of this triad will be discussed. First I will examine body image and its relationship to women's health. Next will be presented a discussion of social physique anxiety, the other construct related to women's experiences of their bodies that will be investigated in the present study. Literature related to restrained eating will then be reviewed. A section will follow discussing exercise's relationship with health and well-being, paying particular attention to the women's experiences of their bodies and food attitudes. Included in the exercise section will be a discussion regarding the motivation for exercise and how it may mediate any relationship between exercise and health. Finally, as qualitative studies can add depth and meaning to quantitative studies, two qualitative studies investigating together women's experiences of exercise, eating, and their bodies will be summarized.

2. Socio-Cultural Context and Objectification Theory

Cultural ideals for the female physique vary over time as culture, society, and science change images and associations between the self and the body (Bartky, 1988; Bordo, 1993). These ideals help to define femininity as "an artifice, an achievement, a mode of enacting and re-enacting received gender norms which surface as so many styles of the flesh" (Bartky, 1988, p.64). Femininity is defined within a culture by arranging items (e.g. character traits, body traits) within that culture and assigning them meaning (Bordo, 1993). Having a feminine body is identified as being crucial to a woman's sense of being female, as femininity symbolizes the norms and models against which women judge, measure, and discipline themselves (Bartky, 1988; Bordo, 1993). The body that women experience is "mediated by constructs, associations and images of a cultural nature" (Bordo, 1993, p.35). In other words, how a woman experiences her body is affected by the socio-cultural context in which she lives.

Objectification theory explores how within this socio-cultural context women's bodies become sexually objectified affecting the psychosocial health of girls and women (Fredrickson & Roberts, 1997). Sexual objectification is the experience of an individual of being treated as only a body, a thing with the sole purpose of being consumed by another (Fredrickson & Roberts, 1997). The most common way that sexual objectification occurs is through visual inspection of the body (Fredrickson & Roberts, 1997). Bartky (1988) states that the body is judged on its "size and contours, its appetite, gesture, posture and general comportment in space, and the appearance of each of its visible parts" (p.80). Through sexual objectification a woman is judged solely on the perception of her body (Fredrickson & Roberts, 1997). In other terms, an

individual's self worth is determined in part by her physique. Further, individuals equate body with self and an individual's body helps to define the individual's self-image (Bartky, 1988; Glassner, 1990). Therefore, a woman's body helps determine that woman's image of herself as a woman. This self is constantly expressed, perceived, and evaluated through the body, as a person can stop talking but cannot stop communicating through their body's physique (Glassner, 1990). As long as the individual's body is being observed, he/she is expressing his/her self-image. In this way, sexual objectification is not under the women's control, but under the control of the observer (Fredrickson & Roberts, 1997). Therefore, women strive to do what they can to control how they are perceived since they cannot stop being observed.

Michel Foucault describes this event well. According to Foucault, this state of constant visibility and inspection instils within the individual a state of consciousness that assures the functioning of cultural power (as cited in Bartky, 1988; as cited in Bordo, 1993). This power asserts itself through self-judgement and constant self-surveillance (Bartky, 1988) or in the words of objectification theory, self-objectification (Fredrickson & Roberts, 1997). Actual comments from others fuel this self-judgement and self-surveillance (Glassner, 1990). Therefore, the surveillor or disciplinarian is everyone and no one in particular (Bartky, 1988). Women feel the pressure to conform to the ideal, thin, fit, feminine body from themselves, men, and culture (Bordo, 1988).

Conforming to this cultural pressure, that is by being thin and fit, women experience feelings of power and pleasure through the promise made by the ideal for freedom, independence, and success (Bordo, 1993; Fredrickson & Roberts, 1997). It is within the complex system of norms, ideals, and values that comprise a culture that

women come to believe that they are worthless unless they are thin and fit (Bordo, 1993). Women are taught not only that thin and fit women are independent and successful, but that only thin and fit women are feminine. Women are socialized to believe that their looks matter, and evidence exists to support this because women perceived as attractive do experience more monetary and career success (Fredrickson & Roberts, 1997; Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998).

Objectification theory states that the socio-cultural context impacts women's body experiences in several ways including: body surveillance, internalization of cultural standards, and beliefs about appearance control (McKinley & Hyde, 1996). In a culture in which a woman's self worth and femininity are constantly under surveillance through her physique, it is theorized that social physique anxiety and body-size dissatisfaction exist and that women may adopt behaviours (e.g. exercise and restrained eating) in an attempt to meet the culturally ideal physique. Therefore, it is necessary to study women's food attitudes, exercise behaviour, and their relationships with their bodies together and within this socio-cultural context. Objectification theory helps to identify why these concepts are linked together and how they are related to the health of North American women.

3. Body Image

i. Introduction

Body image is "a multidimensional construct consisting of a set of cognitions and feelings about one's physique" (Scully et al., 1998, p.116). It involves the evaluation of one's size, weight, or any other aspect of physical appearance (Thompson,

1990). It is an individual's subjective experience of his/her own body (McElhone et al., 1999). Objectification theory states that the socio-cultural context of North America greatly influences women's body images.

There are three components of body image: a perceptual component, a subjective component, and a behavioural component (Thompson, 1990). The perceptual component involves accuracy of perception as compared to measured body size. The subjective component encompasses an individual's cognitive evaluation and subsequent satisfaction and concerns regarding their physique. The behavioural component is the behavioural consequences of the previous two components (Thompson, 1990). It can involve the avoidance of situations that cause appearance-related discomfort or cause individuals to engage in behaviour in an attempt to reduce discomfort (Thompson, 1990).

Body image is important to self-concept (McElhone et al., 1999). Body image concerns can lead to behavioural acts that are linked to self-concept and global self-esteem (Sands, 2000). As this dissatisfaction with body and self becomes larger, it is hypothesized that the drive for thinness starts (Sands, 2000). Drive for thinness emerges in girls and becomes normative which can lead to obsessive-compulsive behaviours often seen amongst girls and women (Sands, 2000). Further, in a review of the evidence for an explanation of the development of eating disorders, Gowers and Shore (2001) proposed that weight and shape concerns played an important role. The relationship proposed by these authors indicates that the many cultural and genetic factors influence the aetiology of eating disorders indirectly through a pathway that is mediated by weight and shape concerns and dietary restraint (Gowers & Shore, 2001).

Body image tends to be lower among women than men (Biddle & Fox, 1998; Scully et al., 1998; Thompson, 1990). As the socio-cultural context influences the development of body image, this gender discrepancy is not surprising (Rucker & Cash, 1992). The same socio-cultural context teaches individuals what behaviours to undertake to improve this image, namely dietary manipulation and exercise (Rucker & Cash, 1992; Silberstein, Striegel-Moore, Timko, & Rodin, 1988). Many studies have been conducted investigating the body image of populations. I will herein review only one such study as it involved a large and representative sample and it typifies the findings of other smaller studies.

McElhone and colleagues (1999) conducted a cross sectional study with 15 239 adults aged fifteen years and older weighted for a nationally representative sample in the European Union. Participants completed a questionnaire that included self-reported height and weight, sociodemographic questions, recent weight changes, strategies undertaken for weight loss, and a body-size dissatisfaction measure. The study found that 39 percent of the sample was satisfied with their body size, and 54 percent wanted to be lighter. More males (46%) than females (31%) were satisfied with their body size. The groups most satisfied with their weight were underweight females (58%) and normal weight males (66%). A disturbing although typical finding was that 20 percent of underweight females reported wanting to lose weight. These findings help prove that negative body image is rampant and that women are more dissatisfied than men, especially when at a self-reported weight within the physiologically healthy range defined by Health Canada (1988, as cited in Gibson, 1990).

ii Body Image Measurement

Many measures of body image exist. Because body image is such a complex construct, many studies measure a singular component – body-size dissatisfaction. Body-size dissatisfaction fits within the subjective component of body image. Body-size dissatisfaction is the perceived difference between current and ideal physiques (Silberstein et al., 1988). However, whether the size of the difference between current and ideal body sizes represents dissatisfaction with the body *per se* is not known. The most common methods for the measurement of body-size dissatisfaction are contour drawings and silhouette scales (Thompson, 1990; Thompson & Gray, 1995; Vogel, 1999). These scales are quick and easy for participants to complete and require no special equipment for administration (Thompson, 1990). In these scales the participant picks a figure that most closely represents what he/she believes his/her body size to currently look like and a second figure that represents his/her ideal body size (Thompson & Gray, 1995). The difference or discrepancy between the two figures represents the body-size dissatisfaction for that subject (Thompson, 1990; Thompson & Gray, 1995).

Many such contour drawing and silhouette scales exist; however, many have not been validated and/or depict unrealistic human forms (Thompson & Gray, 1995). The studies that I will review use a variety of these scales, potentially adding to the mixed results. The Contour Drawing Rating Scale overcomes these problems. In this scale the figures represent realistic waist-to-hip ratios and include all body features (Thompson & Gray, 1995). Also, all figures in succession increase in size an equivalent amount (Thompson & Gray, 1995). The scale has been tested for reliability and validity in a study involving 51 female undergraduate students (mean age 19.3 years) [Thompson &

Gray, 1995]. One week test-retest reliability testing produced a reliability coefficient of $r = 0.78$ ($p < 0.0005$). Concurrent validity of the scale was tested against individual current weight and body mass index. Good concurrent validity was found with a coefficient of $r = 0.71$ for current weight and $r = 0.59$ for body mass index ($p < 0.0005$). Content validity was tested by asking participants to rank figures from thinnest to heaviest and to identify which figures were anorexic or obese. Over 95% of subjects correctly rank ordered the figures. The thinnest two figures were identified as anorexic by over 80% of participants and over 90% of participants identified the largest figure as obese.

The Contour Drawing Rating Scale is designed to reflect differences in weight/size of physiques. Unfortunately these figures do not differ in muscle definition. The question has been raised regarding the usefulness of such scales when study participants are exercising women, as is it assumed that such women prefer muscular physiques (Vogel, 1999). A Medline search performed from 1966 - June 2000 did not reveal a validated scale depicting muscular physiques without the above mentioned problems.

The Athletic Image Scale is a drawing scale aimed at athletic women; however, it is aimed at measuring the growing interest of athletic body shape ideals, not body-size dissatisfaction (Lenart, Goldberg, Bailey, Dallal, & Koff, 1995). It consists of 30 figures that often do not increase in size by a standardized amount (Lenart et al., 1995). Some figures seem to represent unrealistic physiques. This scale also has not been validated or tested for reliability.

The second scale designed for use amongst exercising women consists of nine figures that range from extremely thin to rather large (Furnham, Titman, & Sleeman, 1994). The figures do not represent heavier physiques without extreme muscle definition. This scale is not useful for the present study as many participants may not find a figure that represents either their current or ideal physique. Again the aim of this scale was not to measure body-size dissatisfaction but to determine the acceptance of muscular physiques among women participating in various exercise activities (Furnham et al., 1994).

iii Body Image and Psychosocial Health

Body image is important to psychosocial well-being. In fact, distortion of body image is included as a criterion for depression by Beck (as cited in Thompson, 1990). Body image and self-esteem have a well documented relationship (Silberstein et al., 1988; Tiggemann, 1994). However, body image is more closely related to a woman's than a man's self-esteem (Biddle & Fox, 1998; Scully et al., 1998; Silberstein et al., 1988). This link between body image and self-esteem is believed to stem from body-size dissatisfaction (Silberstein et al., 1988). Body-size dissatisfaction, it is hypothesised, stimulates self-criticism leading to damaged self-esteem (Silberstein et al., 1988). Self-concept theory helps to explain this pathway. Self-concept theory states that the degree of impact that dissatisfaction in one domain has on self-esteem is related to the importance of that domain to the person's self-definition (Tiggemann, 1994). Therefore, since women's physique appearance is of great personal importance in the

socio-cultural context of North America, body-size dissatisfaction will have a large impact on women's self-esteem (Tiggemann, 1994).

Women with greater body-size dissatisfaction may be more prone to negative psychosocial health from the influence of media images. An interesting study exposed women to either a series of 20 slides with pictures of female models' bodies or slides with no human figures (Pinhas, Toner, Ali, Garfinkel, & Stuckless, 1999). One week before and after exposing the 118 female undergraduate students to either slide show participants completed several questionnaires that measured eating disorder symptomatology and mood, including body-size dissatisfaction. The group who viewed the model slides had higher scores for anger ($R^2 = 0.7300$, $p < 0.01$), hostility ($R^2 = 0.7300$, $p < 0.01$), and depression ($R^2 = 0.754$, $p < 0.05$) than students who saw the slides without human figures. Women with higher body-size dissatisfaction responded to the model slides with significantly greater anger ($p < 0.05$) than students with lower body-size dissatisfaction. There was a trend for high scorers on body-size dissatisfaction to respond with greater depression but this did not reach significance ($p = 0.05$). The authors concluded that not only did media images of models cause negative effects on women's moods but that women with body-size dissatisfaction may experience an even greater negative response (Pinhas et al., 1999).

Body-size dissatisfaction is also implicated in clinical eating disorders and subclinical eating disturbances. Studies that looked at a variety of factors in an attempt to predict disordered eating found that body-size dissatisfaction was key in its development (Cooley & Toray, 2001; Thompson, Coovert, & Stormer, 1999). Thompson and colleagues (1999) modeled the development of eating disturbances as

measured by the Eating Disorder Inventory for a sample of 173 female college students. Body-size dissatisfaction and comparison of self to ideals were found to mediate the effects of maturational timing and childhood teasing on eating disturbances. This finding lends empirical evidence to objectification theory as indeed the comparison of self to ideals and body image were key in the development of disordered eating. A further discussion of research into the relationship between body-size dissatisfaction and restrained eating behaviours will follow (see section 5).

4. Social Physique Anxiety

i. Introduction

A similar construct to body image is social physique anxiety (SPA). SPA is the anxiety that arises from the belief that others are observing and negatively evaluating an individual's physique (Hart et al., 1989). The observation and evaluation may be real or imagined by the individual (Hart et al., 1989).

Women have a greater mean Social Physique Anxiety Scale score compared to men (Frederick & Morrison, 1996; Hart et al., 1989; Lantz, Hardy, & Ainsworth, 1997). Objectification theory explains this finding. It states that women are more concerned than men about how they look because they are taught by the socio-cultural context that they must make a specific impression with their physique (i.e. have a thin and fit body) to be deemed feminine. Social physique anxiety is said to occur when individuals believe that they are not making a positive impression and are motivated to do so (Ransdell, Wells, Manore, Swan, & Corbin, 1998).

Social physique anxiety is positively correlated with greater body weight and higher percent body fat (Biddle & Fox, 1998; Crawford & Eklund, 1994; Eklund & Crawford, 1994; Hart et al., 1989; McAuley et al., 1995; Ransdell et al., 1998; Spink, 1992). These findings are expected within the socio-cultural context of North America where value judgements about an individual are derived from physique appearance. In this context, anxiety can increase the further one perceives his/her physique to be from the thin, fit ideal.

ii. The Social Physique Anxiety Scale

The Social Physique Anxiety Scale (SPAS) is used to measure social physique anxiety (Hart et al., 1989). The SPAS was designed as a 12 item, self-report questionnaire that measures, on 5 point Likert-type scale, the extent to which individuals are anxious when others observe their physiques (Hart et al., 1989). The SPAS has been used with adolescents (Eklund, Mack, & Hart, 1996; McAuley & Burman, 1993), university/college students (Crawford & Eklund, 1994; Eklund & Crawford, 1994; Eklund, Kelley, & Wilson, 1997; Finkenberg et al., 1998; Hart et al., 1989; Motl & Conroy, 2000; Spink, 1992), and middle-aged adults (Frederick & Morrison, 1996; McAuley et al., 1995; Ransdell et al., 1998). Hart and colleagues (1989) developed an initial version of the SPAS. In a study involving 43 collegiate males and 46 collegiate females, they determined Cronbach's alpha coefficient (a measure of inter-item reliability) to be 0.90 ($p<0.05$) [Hart et al., 1989]. The test-retest reliability coefficient was 0.82 ($p<0.05$). SPAS scores were found to moderately correlate with other measures of concern over the evaluations of others. Criterion validity was measured by

comparing women's SPAS score to their reactions to actual evaluation of their physiques. The SPAS was found to account for variance in reaction to physique evaluation not explained by other measures of physique and fitness.

McAuley and Burman (1993) revised the SPAS, improving the scale's goodness of fit by changing the wording of question two to eliminate an awkward double negative. The revised SPAS was determined to measure a unidimensional construct and was internally consistent (McAuley & Burman, 1993). Construct validity was proven to be strong with a sample of adolescent recreational and competitive gymnasts (n = 236, age 12 – 18 years) [McAuley & Burman, 1993].

Confirmatory factor analysis was performed by Motl and Conroy (2000) on the SPAS with the McAuley and Burman (1993) revision. Subjects for this study included 146 female and 166 male college students (mean age 22.2 ± 4.0 years) [Motl & Conroy, 2000]. The analysis indicated that the SPAS measured a single factor. As in McAuley and Burman's study (1993), the scale had good construct validity.

Eklund and colleagues (1996) reached a different conclusion in their factor analysis of the SPAS. In that study 760 females were administered the SPAS. Participants were from three groups: 503 college students with a mean age of 20.01 ± 1.9 years, 218 competitive athletes with a mean age of 18.0 ± 2.48 years, and 39 inactive high school students aged 17 and 18 years. These authors concluded that the SPAS measured social physique anxiety that was a higher order factor second to two first-order factors – physique presentation comfort and expectations of negative physique evaluation. Physique presentation comfort corresponded with the positively worded

questions and expectations of negative physique evaluation corresponded with the negatively worded questions.

A second study confirmed these results among a sample of male and female university students (mean age 22.8 ± 3.4 years) [Eklund et al., 1997]. As found previously, a higher order model with two first-order factors fit the data well. Support was also found for editing question two similar to the change made by McAuley and Burman (1993).

A later paper did not support the idea of a two factor structure for the SPAS (Martin, Rejeski, Leary, McAuley, & Bane, 1997). These authors improved the scale's ability to measure the concept of SPA by removing three questions to create a 9-item scale.

Whether or not social physique anxiety is a higher order factor with two first-order factors or a unidimensional construct, it is useful in the present investigation. Social physique anxiety can be used to identify self-presentational concerns amongst women and may be associated with behaviours aimed at physique improvement (i.e. restrained eating and exercise).

iii. Social Physique Anxiety and Psychosocial Health

Social physique anxiety is related to many psychosocial factors. McAuley and colleagues (1995) measured social physique anxiety among middle-aged males and females (n = 114, mean age 54.5 ± 6 years). These researchers found that social physique anxiety was inversely correlated with global self-efficacy. Global self-efficacy is the belief that an individual holds regarding his/her capabilities to meet situational

demands. Self-efficacy is hypothesized to influence an individual's choice of activity, the effort expended with an activity, and persistence with an activity against adversity. Therefore, greater social physique anxiety was associated with less effort expended and less persistence with exercise against adversity. In that study, positive health and fitness outcome expectations helped predict the reduction in social physique anxiety after participation in exercise (McAuley et al., 1995). These outcome expectations are defined as the beliefs or expectations that one has regarding exercise's effect on health and fitness. In other words, the individuals who decreased their social physique anxiety the most expected the biggest improvement in health due to exercise.

Frederick and Morrison (1996) investigated associations between social physique anxiety and many psychosocial factors. Among the 326 male and female university fitness centre members (mean age 20.6 years), social physique anxiety was positively associated with public body consciousness and negatively associated with body competence. Body consciousness is the awareness of private and public parts of the physical self. Body competence is an individual's perceptions of effectiveness within the physical sphere. Body appearance-related motivation for exercise was also positively correlated with social physique anxiety. Negative perception of weight was positively associated with social physique anxiety and exercise enjoyment was negatively associated with social physique anxiety. Therefore, people with high social physique anxiety in that study were more conscious of and thought more negatively of their bodies. Individuals reporting high social physique anxiety also were motivated to exercise by body-appearance related factors and experienced less enjoyment from their exercise routines.

A relationship between body appearance-related motivation for exercise and social physique anxiety was also found in two studies by Crawford and Eklund (Crawford & Eklund, 1994; Eklund & Crawford, 1994). These studies were carried out with two groups of female college students, liberal arts majors (n = 104, mean age 20.8 years) [Crawford & Eklund, 1994] and physical education majors (n = 94, mean age 20.3 years) [Eklund & Crawford, 1994]. Both groups had similar SPA scores with liberal arts majors scoring 40.12 ± 9.75 and physical education majors scoring 37.31 ± 9.81. Greater social physique anxiety was associated with body tone, weight control behaviour, and body appearance-related motivations for exercise for both the liberal arts and physical education majors.

Together these studies point to a relationship between social physique anxiety and psychosocial health. In particular, psychosocial factors related to exercise seem to be associated with social physique anxiety.

iv. Social Physique Anxiety and Eating Behaviour

Objectification theory proposes a link between women's body experiences and eating behaviours. Disordered eating behaviour could be undertaken by women with social physique anxiety in an attempt to improve how their bodies are perceived by others. Social physique anxiety has been investigated in association with eating behaviour in a few studies.

The first published study included social physique anxiety along with other factors in an attempt to predict disordered eating behaviour as measured by the Eating Attitudes Test (Cox, Lantz, & Mayhew, 1997). Study participants included 49 male and

131 female undergraduate students with a mean age of 19.30 ± 2.41 years. Social physique anxiety, percent body fat, and gender predicted 34% ($p < 0.0001$) of the variance in disordered eating behaviour. Of these three factors, social physique anxiety accounted for the most variance in disordered eating behaviour.

A similar study was conducted with 79 female college students (mean age 19.5 years, range 17-46 years) [Frederick & Morrison, 1998]. In that study disordered eating behaviour was measured with the Eating Disorders Inventory. Social physique anxiety was predictive ($\beta = 0.57$, $p \leq 0.05$) of eating disordered behaviours that in turn were predictive ($\beta = 0.53$, $p \leq 0.05$) of eating disordered traits. These authors concluded that social physique anxiety could be useful in identifying individuals at risk for eating disorders.

The third study also investigated social physique anxiety in association with the Eating Attitudes Test (EAT) [Diehl, Johnson, Rogers, & Petrie, 1998]. This investigation included measures of anorexic and bulimic symptomatology, depression, self-esteem, and exercise dependence. Participants included 160 female undergraduate students (mean age 21.53 ± 3.95 years). Social physique anxiety, exercise dependence, and depression together predicted 23% ($p < 0.01$) of the variance in EAT scores. Of these three variables, social physique anxiety contributed the most towards predicting eating behaviour. Social physique anxiety predicted 15% ($p < 0.01$) of the variance in EAT scores with exercise dependence adding five percent ($p < 0.01$) and depression adding two percent ($p < 0.05$) to the predictive ability of the equation. Based on these results the authors concluded that social physique anxiety was important to the development of eating disorders.

The most recent study included a younger sample (Thompson & Chad, 2000). The participants in this study were 77 pre- and post-pubescent girls (mean age 10.9 ± 0.3 years). Unfortunately social physique anxiety was not compared directly with eating behaviour and body dissatisfaction. The study did find, however, that the post-pubescent girls had significantly greater social physique anxiety ($p < 0.05$), and higher scores on the three scales used from the Eating Disorders Inventory, namely body dissatisfaction ($p < 0.05$), bulimia ($p < 0.05$), and drive for thinness ($p < 0.05$) than the pre-pubescent girls.

When the results of these studies are considered together, there is good evidence that social physique anxiety is associated with eating disorders. As will be discussed next, restrained eating, while not as extreme as eating disorders, may still have negative physiological and psychosocial implications. Therefore, there is merit in investigating whether social physique anxiety is associated with this less extreme but still potentially harmful behaviour. Also the present study will combine body image and social physique anxiety in the same investigation allowing a direct comparison between the two with respect to their association with food attitudes.

5. Restrained Eating

i. Introduction

The tendency to consciously attempt to restrict dietary intake in order to meet self-imposed or socially imposed weight ranges is termed restrained eating. Restrained eaters rely on cognitive dieting rules to control eating behaviour instead of physiological signs of hunger (Paa & Larson, 1998). Restrained eaters are typically very conscious of

the amount and type of food that they consume (McLean, Barr, & Prior, 2000; McLean, Barr, & Prior, 2001). The term 'dieting' is similar to dietary restraint, however, the two terms are not synonymous, as not all women who are consciously attempting to restrict dietary intake identify themselves as being on a 'diet'.

Polivy (1996) stated that restrained eaters are akin to those undergoing more severe food restriction. Classic studies of food restriction from the 1940's found that the subjects became focused on food and when reintroduced to food, gorged themselves (Polivy, 1996). Although a majority of women who cognitively restrict intake are not successful at actual dietary restriction, this "psychological restriction" can lead individuals to experience the symptoms related to dietary restriction (Polivy, 1996).

A study investigated restrained eating in association with weight control for a large population (714 women mean age 35.9 ± 6.2 years and 229 men mean age 35.2 ± 6.0 years) enrolled in a community-based weight gain prevention program (Neumark-Sztainer, Sherwood, French, & Jeffrey, 1999). This study used the TFEQ to measure restrained eating. Women reported greater dietary restraint than men with a mean score of 9.14 ± 0.10 versus 5.87 ± 0.27 respectively ($p < 0.001$). Dietary restraint was a more consistent behaviour over the three years of the study than dieting for both men and women. Dieting was reported in more than one year by 29.0 % to 44.3 % of respondents while high dietary restraint was reported in more than one year by approximately 57 % of respondents. This is of concern as the potential health risks of a behaviour increase with that behaviour's duration and consistency (Neumark-Sztainer et al., 1999).

A study by Cooley and Toray (2001) also found dietary restraint to be very stable. One hundred and seventeen female college students were followed from their first

year to their fourth year of college. The strongest predictors for the participant's final restraint score (measured by the Herman and Polivy Restraint Scale) were the original restraint score ($\beta = 0.48$) and body-size dissatisfaction ($\beta = 0.36$). Other factors such as self-consciousness and depression were not predictive of restraint score.

ii. Measuring Restrained Eating

The investigations into dietary restraint that I will discuss use Herman and Polivy's Revised Restraint Scale, the Dutch Eating Behavior Restraint Questionnaire (DEBQ), and the Three Factor Eating Questionnaire (TFEQ). These questionnaires have all been developed to measure dietary restraint. They differ in reliability, validity, and the underlying construct assessed, which may help explain the different results amongst studies. Allison and colleagues investigated the differences between the TFEQ, DEBQ, and Herman and Polivy's Revised Restraint Scale for a variety of reliability and validity parameters (Allison, Kalinsky, & Gorman, 1992). Of note was that the Revised Restraint Scale was easily affected by social desirability; therefore, these authors did not recommend using this scale. Also Allison and colleagues (1992) raised the question of whether the scales measured the same construct. These authors recommended using the TFEQ over other measures of dietary restraint as it was a psychometrically sound and unreactive measure.

In a population of 393 adolescent females the Restraint subscale of the Dutch Eating Behaviour Questionnaire was found to have good test-retest reliability ($r = 0.85$, $p < 0.0001$) and internal consistency (Cronbach's alpha = .94, $p < 0.0001$)[Banasiak, Wertheim, Koerner, & Voudouris, 2001]. The researchers however, included a glossary

of terms with the questionnaires; therefore, conclusions should be drawn with caution regarding the reliability of the questionnaire without the use of a glossary.

A more recent comparison of the TFEQ and Herman and Polivy's Restraint Scale reached a similar conclusion to that of Allison and colleagues (1992) [Van Strien, 1999]. In that article, the author concluded that amongst individuals with high dietary restraint there are two sub-groups – successful dieters and unsuccessful dieters (Van Strien, 1999). Successful dieters have high restraint and a low susceptibility towards failure while the unsuccessful dieters are susceptible to failure of restraint. The TFEQ, stated the author, is able to distinguish between the two sub-groups due to the hunger and disinhibition factors; however, the Restraint Scale cannot differentiate between the two groups. Therefore, Van Strein (1999) recommends use of the TFEQ.

The TFEQ was used to measure eating behaviour in the present investigation. The three dimensions, or factors, of human eating behaviour measured by this questionnaire are cognitive control of eating (factor I), disinhibition (factor II) and susceptibility to hunger (factor III) (Gorman & Allison, 1995; Stunkard & Messick, 1985). Factor I is the conscious restriction of food intake known as restrained eating (Stunkard & Messick, 1985). Factor II refers to the disinhibition of cognitive control of eating, or in other words, losing control of dietary restraint (Stunkard & Mesick, 1985). Factor III is the feeling of hunger and its behavioural consequences (Stunkard & Messick, 1985). Stunkard and Messick (1985) tested the scale for reliability and intercorrelation in a study involving 98 subjects. The scale was found to be able to discriminate between groups previously defined as different in restrained eating behaviour.

Construct validity was performed on factors I and II in a large sample (46 132 women, mean age 43.6 ± 12.7 years; 8393 men, mean age 45.6 ± 12.2 years) by Westenhoefer (1991). The TFEQ had good construct validity when compared to observed restrained eating behaviour in this largely obese (BMI ≥ 27.4) sample (Westenhoefer, 1991). Construct validity of all three factors was also investigated amongst a small group of 31 female participants (mean age 26.7 years) in another study (Shearin, Russ, Hull, Clarkin, & Smith, 1994). Cognitive restraint and disinhibition were not correlated with each other, but hunger was correlated with disinhibition (Shearin et al., 1994). Internal consistency was good for disinhibition and cognitive restraint, but hunger had poor internal consistency (Shearin et al., 1994). In a study involving undergraduate students, the TFEQ had good test-retest reliability (n= 34, mean age 24.1 ± 8.4), moderate internal consistency (n = 901, mean age 23.1 ± 7.1), and good social desirability discriminant validity (n = 73, mean age 22.3 ± 6.3) [Allison et al., 1992].

iii. Restrained Eating and Physiological Health

Restrained eating may have physiological implications, including an impact on bone health. Women with high dietary restraint have had subclinical ovulation disturbances (Barr, Janelle, & Prior, 1994a; Schweiger, Tuschl, Platte, Broocks, Laessle, & Pirke, 1992), which may be associated with excess spinal bone loss (Prior, Vigna, Schechter, & Burgess, 1990). In one study, 45 participants (aged 20 to 40 years) completed the TFEQ and then prospectively recorded ovulatory functioning for six months (Barr et al., 1994a). Those women with high restraint reported fewer menstrual

cycles and shorter luteal phase lengths than women with low dietary restraint (Barr et al., 1994a).

The findings by Barr and colleagues (1994a) strengthened those of Schweiger and colleagues (1992). Schweiger and colleagues (1992) compared the menstrual functioning of nine restrained (mean age 22.0 ± 0.9 years) and thirteen unrestrained women (mean age 22.2 ± 1.5 years). The women in the restrained eating group experienced shorter, more irregular cycles and shorter luteal phase lengths.

A second study by Barr and colleagues (1994b) also found shorter luteal phases among the nine women in the high restraint group (mean age 41.5 ± 1.4 years) versus the nine women in the low restraint group (mean age 40.3 ± 1.8 years). That study looked at measures of bone mineral density in the lumbar spine. Although no significant differences in bone mineral density between the high restraint and low restraint groups were found, this could have reflected the combination of large variability in density and the small sample size.

The findings of this study sparked a study by another group of researchers on bone mineral density, bone mineral content, and restrained eating in a larger population (Van Loan & Keim, 2000). In that study 185 women, aged 18 to 45 years, were divided into a high restraint or a low restraint group based on their responses to the Three Factor Eating Questionnaire. The two groups were not significantly different in age, height, weight, body composition, or physical activity ($p<0.05$). The two groups did not differ significantly in bone mineral content or density. However, when both groups were combined and dietary restraint was used as a continuous variable, there was a significant difference ($p < 0.05$) in bone mineral content between those individuals with the five

highest scores and those with the five lowest scores on the TFEQ. Further, when weight was entered into the analysis, women with high restraint had significantly ($p < 0.05$) lower bone mineral content in three of four weight quartiles. Although a relationship was seen between bone mineral content and dietary restraint, bone mineral density was not found to differ between the high and low dietary restraint groups.

Further investigations have been conducted to test the hypothesis that dietary restraint may affect the hormonal control of bone. Among women with regular menstrual cycles ($n = 62$, mean age 21.6 ± 2.5 years), high restraint scores on the TFEQ were associated with higher 24 hour urinary free cortisol and cortisol/creatinine excretion than women with low restraint scores (McLean et al., 2000). McLean and colleagues (2000) proposed that the cognitive stress of restrained eating caused an increase in the release of cortisol, which could cause a decrease in bone mineralization.

Support for this hypothesis was presented in a subsequent paper by the same researchers. Dual energy x-ray absorptiometry was used to determine spinal (L1-L4) and total body bone mineral content and density in study participants (McLean et al., 2001). Subjects with high dietary restraint scores on the TFEQ had lower total body bone mineral content than subjects with low dietary restraint when weekly exercise hours, weight, and height were entered in the analysis as covariates. Spinal bone mineral density, total body bone mineral density, and spinal bone mineral content were all non-significantly ($p > 0.05$) different between the high and low restraint groups. Exercise activity was positively correlated with spinal bone mineral density, total body bone mineral density, and total body bone mineral content. Exercise activity was greater for

the high restraint group than the low restraint group; however, it appeared that exercise did not completely offset the negative effect of dietary restraint on bone mineralization.

In addition to the possible effect on bone health, restrained eating may affect physiological health through poor food choices (Wardle, Steptoe, Oliver, & Lipsey, 2000). A study investigating food choices during times of life stress found that individuals with high dietary restraint as measured by the Dutch Eating Behavior Questionnaire, consumed more energy ($p < 0.05$), fat ($p < 0.05$), and saturated fat ($p < 0.01$) than individuals with low dietary restraint. The study looked at the dietary intakes of 58 women aged 36.29 ± 11.98 years and 32 men aged 34.68 ± 10.14 years working in a department store. Twenty-four hour food recalls were used to determine the dietary intake of these individuals during times of low and high work stress. The food choices of those with high dietary restraint led the authors to conclude that "restrained eaters are particularly vulnerable to adverse effects of stress on health, through influences on food intake" (Wardle et al., 2000, p. 195).

In addition to bone health, dietary restraint has been associated with another factor of poor physiological health – cigarette smoking. A study involving 696 grade 9 girls found that those who smoked reported greater dietary restraint (2.61 ± 1.14) measured by the Dutch Eating Behaviour Questionnaire than non-smokers (2.08 ± 0.92) [Crocker, Kowalski, Kowalski, Chad, Humbert, Forrester, 2001].

Overall these studies point to the possible negative physiological health impact of high dietary restraint. This combined with the research into the relationship of restrained eating with poor psychosocial health and the development of eating disorders, raises warnings about the seriousness of restrained eating.

iv. Restrained Eating, Eating Disorders, and Psychosocial Health

In addition to physiological health factors, many studies have investigated restrained eating in association with psychosocial health. The Herman and Polivy Revised Restraint Scale, Dutch Eating Behavior Questionnaire, and the TFEQ have been used in these investigations. Overall, it has been found that female restrained eaters have lower self-esteem, greater depression and negative emotionality, greater body dissatisfaction, and poorer body image than women with low restraint scores (Eldredge, Wilson, & Whaley, 1990; Lindholm & Wilson, 1988; Paa & Larson, 1998; Polivy, 1996; Polivy & Herman, 1999; Sanftner & Crowther, 1998).

Several studies have investigated the psychosocial affect of restrained eaters compared to either unrestrained eaters and/or individuals with clinically diagnosed eating disorders. Many of these studies included measures of body image along with other measures of psychosocial health. Therefore, both psychosocial health and body image will be discussed in this section. Eldredge and colleagues (1990) compared the Beck Depression Inventory scores of 24 restrained eating undergraduate women to 24 unrestrained control undergraduate women (mean age 19.96 years). The Herman and Polivy Revised Restraint Scale was used in that study (Eldredge, et al., 1990). The restrained eating group had significantly ($p < 0.001$) greater depression scores than the unrestrained control group. Polivy and Herman (1999) used the Herman and Polivy Revised Restraint Scale and found greater depression among undergraduate, female restrained eaters ($n = 36$) than undergraduate, female unrestrained eaters ($n = 44$). In another study, depression scores among 21 restrained eaters (mean age 23.4 ± 2.1 years)

and 20 unrestrained eaters (mean age 24.1 ± 2.6 years) were investigated in association with body dissatisfaction (Lautenbacher, Thomas, Roscher, Strian, Pirke, & Krieg, 1992). The Herman and Polivy Revised Restraint Scale was also used in that study. The restrained eating group had higher depression scores than the unrestrained group (Lautenbacher et al., 1992). Depression scores were correlated with greater body dissatisfaction for both groups of women (r's ranging from 0.35 to 0.65) [Lautenbacher et al., 1992]. Restrained eating as measured by the Dutch Eating Behaviour Questionnaire was associated with depression ($r = 0.18$, $p < 0.05$) and being emotional ($r = 0.15$, $p < 0.05$) in a fourth study including 167 college students (Heaven, Mulligan, Merrilees, Woods, & Fairooz, 2001).

Self-esteem has also been investigated in relation to restrained eating. Eldredge and colleagues (1990) found that female undergraduate restrained eaters had lower self-esteem than control subjects. Polivy and Herman (1999) found similar results among 80 introductory psychology students. Tiggemann (1994) studied the association between restrained eating and self-esteem in combination with an investigation into the association between body-size dissatisfaction and self-esteem. Study subjects included 202 female undergraduate students with a mean age of 22.5 ± 7.4. The Herman and Polivy Revised Restraint Scale was used in that investigation. Both restrained eating and body-size dissatisfaction were inversely related to self-esteem among the female undergraduate students.

Crocker and colleagues (2001) found similar results amongst female grade 9 students. In that investigation dietary restraint (measured by the Dutch Eating Behaviour Questionnaire) correlated negatively with body appearance as measured by the Physical

Self Perceptions Profile (r's ranged from –0.17 to -0.47, $p < 0.05$). Restraint was also negatively correlated with global self-esteem ($r = -0.45$, $p < 0.05$).

Some studies have focused specifically on restrained eating and body image. One study using the TFEQ compared 21 female restrained eaters to 20 unrestrained women (Lautenbacher et al., 1992). That study used many measures of body perception and body image including the video distortion technique, image marking procedure, and kinaesthetic size estimating apparatus. Lautenbacher and colleagues (1992) found that the restrained eaters were more dissatisfied with their body. Body dissatisfaction was not correlated with actual height for weight (body mass index) or body fat content. That study concluded that there seems to be a positive relationship between restrained eating scores and body dissatisfaction regardless of actual body size.

The study by Lautenbacher and colleagues (1992) built upon the findings of Eldredge and colleagues (1990). That investigation included 48 female undergraduate students with a mean age of 19.96 years. Students with high dietary restraint reported greater body dissatisfaction and lower body image scores on the Eating Disorders Inventory than students with low restraint scores. The Eating Disorders Inventory measures an individual's attitudes towards self, eating, and his/her body. An interesting finding by these investigators was that the restrained eaters consistently described their bodies in evaluative terms (they evaluated how well their bodies compared to ideals), whereas the unrestrained group did not describe their bodies in such terms.

In a later study, a group of former anorexia nervosa patients ($n = 23$, mean age 22.9 years) were added to the high dietary restraint ($n = 21$, mean age 23.4 years) and low dietary restraint groups ($n = 20$, mean age 24.1) [Lautenbacher, Kraehe, & Krieg,

1997]. These investigators again used the TFEQ. The former anorexia nervosa patients did not differ from the restrained eating group in terms of body-size dissatisfaction. Both former patients and restrained eaters reported greater body-size dissatisfaction than the low dietary restraint group.

Lindholm and Wilson (1988) found similar findings amongst smaller groups (n=12, mean age 20.4 years) of restrained, unrestrained, and bulimic women. These investigators also used the Eating Disorders Inventory and the TFEQ but added other measures of body image such as the Body Image Semantic Differential and the Eating Habits Checklist. The restrained eating group consistently reported lower body image than the unrestrained group. However, few differences were seen between the restrained eating group and the subject group diagnosed with clinical bulimia.

Another study compared restrained eaters, women with a history of an eating disorder, and a control group of non-restrained eaters (Sunday & Halmi, 2000). There were 53 women in the recovered eating disorder group (mean age 30.06 ± 10.30 years), 29 women in the restrained eating group (mean age 28.79 ± 8.49 years), and 36 women in the control, unrestrained eating group (mean age 24.89 ± 10.35 years). The Dutch Eating Behavior Questionnaire was used to measure dietary restraint. All participants completed the Yale-Brown-Cornell Eating Disorders Scale that measures eating disorder symptomatology (i.e. preoccupation, ritual, sum of preoccupation and ritual scores, and motivation to change). That study found no significant differences ($p < 0.05$) between the restrained eating group and the recovered eating disorder group. The unrestrained control group was significantly different ($p < 0.05$) from the other two groups with one exception; restrained eaters were not significantly different ($p < 0.05$) than the controls

on the ritual score. In other words, the restrained eaters in this study exhibited the same eating disorder symptomatology as recovered eating disordered individuals except the restrained individuals did not participate in the rituals often undertaken by individuals with eating disorders. An interesting finding was that the unrestrained control group did not understand the rituals and preoccupation questions and were confused by the idea that individuals may participate in such thoughts and behaviours. The restrained group however, while not undertaking these activities recognised and understood them. These findings lend strength to the idea that while restrained eating may not be as extreme a danger as eating disorders, restrained eaters and individuals with eating disorders may share some common unhealthy thoughts, behaviours, and motivations.

In their review to determine the pathway for the development of eating disorders Gowers and Shore (2001) concluded that genetic and cultural factors, such as the cultural value of thinness, parental weight concern, obesity, the physical changes of puberty, perfectionism, and impulsivity, largely did not directly cause eating disorders. These authors proposed that these factors exerted their effect on the development of dietary restraint and weight and shape concerns that caused dieting, which in turn caused anorexia nervosa and bulimia nervosa (Gowers & Shore, 2001). Therefore, restrained eating may be harmful in itself and because of the potential for the development of clinical eating disorders.

Using a different approach, Paa and Larson (1998) used the findings of previous research to investigate whether restrained eating behaviour (as indicated by the Herman and Polivy Revised Restraint Scale) could be predicted by measuring body dissatisfaction, self-esteem, and negative affect. The investigators studied 145 middle-

aged women with a mean age of 43.22 ± 7.52 years. This study population was older than those investigated previously. Body dissatisfaction, self-esteem, and negative affect all predicted restrained eating, explaining 32% ($p < 0.01$) of the variance in dietary restraint. These investigators concluded that their study added to the literature due to their inclusion of multiple variables, and recommended that future studies include multiple variables in order to further explain restrained eating behaviour.

In conclusion, research has found that restrained eating is associated with poor body image, and perhaps eating disorders and poor overall psychosocial health. There may also be physiological health implications with restrained eating. Although studies in this area have used three different measures of restrained eating, the trends persist.

6. Exercise

i. Introduction

In addition to restrained eating, women can undertake exercise in an attempt to obtain the thin, fit, ideal body. In fact, Bartky (1988) states that the current ideal requires exercise and altered eating behaviour for a majority of women (Bartky, 1988). Therefore, women exercise and restrict their eating not only for fitness, but to meet the requirements of femininity. Unfortunately, as the high rate of failure of eating and exercise programs suggests, the ideal body is for most women difficult (if not impossible) to attain (Garner & Wooley, 1991). Women come to perceive that appetite and unconstructed contours (the opposites of thinness and fitness) pose a threat to their femininity (Bartky, 1988). Glassner (1990) supports this theory, stating that it is not

only the recommendations of health promotion agencies, but also the dominant images in North American culture that have influenced people to exercise.

In this way the media promotes and adds to the sexual objectification of women (Fredrickson & Roberts, 1997). The concepts of fitness, thinness, and health are synonymous in this culture driven by images, and these concepts include both exercise and eating habits (Glassner, 1990). Fitness, Glassner writes, is perceived to promise an escape from the "ills of modern culture" (p. 221). Fitness achieved through exercise and eating correctly promises not only control over, or mastery of, one's appearance and health, but also control over other aspects of life such as the job and love markets (Bordo, 1993; Glassner, 1990).

ii. Exercise Motivation

Motivation for exercise can include fitness/health management, body-appearance/ weight management, stress/mood management, skill mastery/competition, and socializing (Chen, 1998; Duda & Tappe, 1989). Research in this area largely confirms what objectification theory states about women in the North American socio-cultural context; namely, that body-appearance motives are largely behind women's decisions to exercise (Biddle & Fox, 1998; Chen, 1998; Davis & Cowles, 1991; Finkenberg, DiNucci, McCune, & McCune, 1994; Frederick & Ryan, 1993; Puretz, Haas, & Meltzer, 1996). Chen (1998) compared the motivation for exercise among 180 American students aged 22 ± 2.9 years and 289 Chinese college students aged 21 ±1.7 years. Socialization was the primary motivator for Chinese men, Chinese women, and American men. In contrast, body appearance-related factors motivated American

women to exercise. Chen (1998) proposed that Chinese women already perceive their physiques as thin, and that men did not feel the same pressures for fit physiques; therefore, they were able to be motivated for exercise by social interaction.

The study conducted by Puretz and colleagues (1996) found similar results to those of Chen's study. In that study questionnaires were distributed to 497 women ranging in age from 14 to 81 years competing at races, attending fitness centres, at an educational institution, and at a union meeting. Eighty-eight percent of the women who exercised reported that they did not exercise for skill mastery/competition but for weight control (Puretz et al., 1996). Finkenberg and colleagues (1994) also found similar results among 206 female and 88 male college students. In their study, women were motivated for exercise primarily by appearance and weight management; whereas, men were primarily motivated by competition. Finkenberg and colleagues' (1994) study included students enrolled in classes of various physical activities (e.g. aerobics and jogging).

Most of the studies involving exercise motivation use samples of younger women, often college or university students. However, appearance-related motivation for exercise may be stronger for younger women than older women (Scharff, Homan, Kreuter, & Brennan, 1999). A study separated women into age groups in order to investigate this theory (Scharff, et al., 1999). For women aged 50 and over health was the main motivation for exercise. While similar to other studies' findings, appearance-related factors primarily motivated women under 50 years of age. Unfortunately the researchers did not postulate why there may be an age or cohort related difference in exercise motivation.

Exercise motivation has been investigated in association with measures of psychosocial health. Frederick and Ryan (1993) investigated the relationship between exercise motivation, multiple components of psychosocial health, and type of exercise activity undertaken by 376 adult men and women (mean age 39 years). Body-appearance related motivation was associated with lower body appearance self-esteem, lower global self-esteem, greater anxiety, and greater depression. The most common motivation for women participating in fitness-related exercise (e.g. aerobics) was body appearance-related motives, whereas, women participating in sports (e.g. basketball) were motivated primarily by skill mastery/competition. Therefore, participation in fitness activities versus sports was correlated with body appearance-related motivation and poorer psychosocial health.

Motivation for exercise was investigated in association with affect, adherence to exercise, perceived competence in, and satisfaction with exercise by Frederick and colleagues (1996). The study included 38 men and 80 women (mean age 22 years) who attended Southern Utah University. Positive affect is positive feelings about the self (e.g. contentment, relaxation, invigoration, well-being, and energy). Negative affect includes such constructs as depression, anxiety, guilt, tension, and uneasiness. Among women, interest/enjoyment and skill mastery/competition motivators were associated with greater positive affect compared to women motivated for exercise by body-appearance related factors. In other words, women motivated for exercise by interest/enjoyment and skill mastery/competition were found to have better psychosocial health than women motivated by body appearance-related factors. No motivational factors were predictive of frequency of exercise.

Body-appearance is the predominant motive for women to exercise. Women involved in different activities may be motivated by different factors. For example, those in sports may be motivated by skill mastery/competition whereas women involved in fitness activities remain mostly driven to exercise by body-appearance related motives. The issue is raised that body-appearance related motivation can be associated with poorer psychosocial health. This may help to explain why investigations into the effect of exercise on psychosocial health find such mixed results. The relationship between exercise and health is not simple and factors such as exercise motivation may mediate the relationship.

iii. Exercise and Physiological Health

It has been well established that physical activity leads to improved physiological health. Many health promotion bodies recommend regular physical activity for the promotion of health, for example, there is: Canada's Physical Activity Guide to Healthy Active Living by Health Canada and the Canadian Society for Exercise Physiology (1998); the Heart Health Coalition's B.C.-Setting the Pace: A plan to improve the health of British Columbians through physical activity (Stewart, 1997); and recommendations from The American Dietetic Association (1999), the U.S. Centers for Disease Control and Prevention, and the American College of Sports Medicine (Pate et al., 1995). Epidemiological research and intervention studies have found that physical activity is associated with reduced risk for coronary heart disease, hypertension, non-insulin-dependent diabetes mellitus, osteoporosis, and some cancers (Burnham, 1998; Health Canada and the Canadian Society for Exercise Physiology, 1998; Pate, et al., 1995;

Scully, et al., 1998). The terms physical activity and exercise are often used interchangeably; however, they are two distinct entities. Exercise is a component of physical activity that involves structured and repeated activity with a goal of improving or maintaining physical fitness (Shelton & Klesges, 1995). In contrast, physical activity is simply any movement that causes energy expenditure (Kriska & Caspersen, 1997). Increasing exercise is often targeted by health promotion bodies as a way to increase physical activity (Health Canada and the Canadian Society for Exercise Physiology, 1998).

What is not mentioned by these sources is the possibility of physiological ill health with exercise. An example is the female athlete triad that can be experienced by women committed to intense exercise regimens (Burnham, 1998; Scully et al., 1998). These interrelated disorders include disordered eating, amenorrhoea, and osteoporosis (Scully et al., 1998).

Secondly, exercise addiction or dependence exists (Bamber, Cockerill, & Carroll, 2000; Biddle, 1995). Exercise addiction/dependence is defined as a preoccupation with exercise that becomes stereotyped and routine and interferes with other areas of functioning (Bamber et al., 2000). Withdrawal from exercise in exercise addiction/dependence causes significant symptoms including mood swings, anxiety, and irritability (Bamber et al., 2000). A review of eleven studies investigating exercise dependence/addiction concluded that exercise can be a compulsive behaviour and that the results of exercise addiction can include physical injury and excessive fatigue (Biddle, 1995). In addition to the physiological implications, exercise dependence/addiction may be associated with poorer body image. Smith, Wolfe, and

Laframboise (2001) found that women who displayed exercise addiction had lower BMIs ($p = 0.01$), were more fat anxious ($p = 0.05$), and were more dissatisfied with their hips and thighs ($p < 0.02$) than the control group. The subjects in that study were 94 women aged 36.66 ± 12.08 years recruited through flyers in the community. Fat anxiety was measured by the Multidimensional Body-Self Relations Questionnaire Overweight Preoccupation Scale, and body dissatisfaction was measured by an Adjustable Light Beam Apparatus (Smith et al., 2001).

Also of note is the finding that many individuals diagnosed with eating disorders follow extreme exercise patterns. Bamber and colleagues (2000) investigated the presence of psychological problems and personality of young adult women with either primary or secondary exercise dependence. Primary exercise dependence involved individuals who exhibited exercise dependence without eating disorder symptomatology. Secondary exercise dependence was defined as individuals with eating disorders who also exhibited exercise dependence. Two hundred and ninety one women (mean age 28.8 ± 8.39 years) recruited from a variety of sources including athletic and fitness clubs and eating disorder clinics, completed questionnaires. The participants were grouped into four groups: primary exercise dependence, eating disordered only, both eating disordered and exercise dependent (secondary exercise dependence), and a control group with neither exercise dependence nor eating disorders. The control group was found to have the best psychosocial health amongst the four groups. The primary exercise dependent group, while not exhibiting as great a psychosocial morbidity as the eating disordered and secondary exercise dependent groups, did report greater morbidity than the control group. Of interest was the finding that both primary and secondary exercise

dependent groups undertook exercise not for health reasons but for social, psychological, and appearance-related reasons.

A second study investigated exercise addiction/dependence in persons diagnosed with eating disorders (Brewerton, Stellefson, Hibbs, Hodges, & Cochrane, 1995). These investigators used the medical records of 110 women diagnosed with anorexia nervosa, bulimia nervosa, both anorexia and bulimia nervosa, and eating disorder not otherwise specified. Several differences were seen between those individuals who did and did not report exercise dependence. The exercise dependent group was more dissatisfied with their bodies ($p < 0.03$), more likely to vomit ($p < 0.01$), and more likely to use laxatives ($p < 0.01$). There were more individuals with anorexia nervosa in the exercise dependence group than the non-exercise dependent group ($p < 0.06$). Lastly, for exercise addicted participants with anorexia nervosa, dieting started at a significantly younger age (12.1 ± 3.0 years) than non-exercise addicted participants with anorexia nervosa (16.3 ± 1.8 years, $p \leq 0.02$).

Aside from exercise addiction/dependence, exercise itself may be associated with eating disorders. The role of exercise in the development of eating disorders was investigated by Davis and colleagues in two studies (1990; 1994). In the first study several factors were investigated: weight, diet, and appearance attitudes; degree of exercise; and, psychological characteristics associated with eating disorders (Davis, Fox, Cowles, Hastings, & Schwass, 1990). Study subjects included 110 women recruited from the University of Toronto, fitness clubs, and other locations around Metropolitan Toronto. It was found that dieters exercised more (frequency and intensity) than non-dieters and that dieters were more likely to exercise for weight control and appearance

improvement than non-dieters. The dieting, exercising women expressed weight and diet concerns similar to individuals with eating disorders. Moreover, when results were modeled, it was found that weight and diet concerns did not predict exercise activity but that exercise activity predicted weight and diet concerns.

The second study by these investigators set out to profile the exercise history of a group of women hospitalized with eating disorders, compare this to matched peers without eating disorders, and determine how often exercise preceded dieting (Davis et al., 1994). Forty-five women (mean age 24.6 ± 4.84 years) completed semi-structured interviews and symptom checklists. Seventy percent of the participants reported being more physically active than their peers previous to the onset of their eating disorders. Also, 60 percent of respondents reported participating in competitive sports beyond the intramural level. Ninety-three percent of the women believed their need to exercise to be out of their control, and 78 percent believed they exercised more than a normal amount. Exercise addiction was reported to precede dieting by 60 percent of the women and 75 percent reported that during their time of greatest weight loss, exercise increased steadily as eating decreased.

Together these studies point to the possible negative physiological health effects of exercise for women. It can be concluded that for individuals with eating disorders, exercise addiction/dependence is common. It may be that exercise precedes eating disorders for some women. Perhaps exercise focuses attention on the body and in the current socio-cultural context, this can lead to disordered eating behaviours.

iv. Exercise and Psychosocial Health

A huge body of research exists investigating the effect of exercise on psychosocial health. The results of this research are mixed (Frederick & Ryan, 1993). Due to the size of the body of literature on this topic, a selection of review papers is included that discuss the effect of exercise on a wide range of psychosocial health variables. Following are specific discussions regarding the literature that investigates exercise's relationship with the constructs of the present study, body image, social physique anxiety, and restrained eating.

Earlier studies did not find much psychosocial benefit due to exercise; however, anecdotal evidence for the benefit of exercise was strong. Hughes (1984) reviewed the older literature regarding the effects of habitual aerobic exercise on mood, personality, and cognition and concluded that only self-concept was improved with exercise. Improvements due to aerobic exercise in anxiety, depression, body image, personality, and cognition were not substantiated. According to Hughes (1984), the body of literature investigating the effects of habitual aerobic exercise on psychosocial health had several major flaws. These flaws included poor choices of psychological constructs and experimenter/subject biases. A large proportion of the studies used global self-rating scales developed for use with clinical populations. This poses a problem as such scales are sensitive to subject bias and may be insensitive to changes in non-clinical populations. The subject populations varied considerably among the studies in the review as did the methods of exercise measurement. As most subjects and experimenters have *a priori* biases about the benefits of exercise, these could confound

the results because people feel good about doing something perceived as 'good' for themselves (Biddle, 1995; Hughes, 1984; O'Brien & Vertinsky, 1991).

More recent research has improved upon some of the flaws mentioned by Hughes; however, results are still inconclusive. Scully and colleagues (1998) completed a review of the literature investigating the effects of exercise on depression, premenstrual syndrome, body image, anxiety, stress responsivity, mood, and self-esteem in a variety of subject groups. In this review, depression was one of the components of psychosocial health that did benefit from exercise, especially for individuals experiencing clinical depression. Exercise, specifically aerobic exercise, also seemed to be associated with a reduction in anxiety. The effects of exercise on mood were concluded to be transient at best. The negative impacts of exercise on psychosocial health included exercise addiction/dependence and obsessive-compulsiveness. Scully and colleagues (1998) concluded that although specific exercise regimens may be beneficial for the treatment of some psychological disorders, they warned that exercise should not be considered a psychological cure-all.

Many meta-analyses have been conducted in this area. In 1995 Biddle reviewed the meta-analyses performed to that date. In those meta-analyses, effect size of exercise on the psychosocial health variables was calculated by finding the difference between treatment and control means and dividing that difference by either the control group or pooled standard deviation (Biddle, 1995). The review of the effect of exercise on anxiety and stress reactivity produced the conclusion that exercise may produce small to moderate decreases in anxiety and stress reactivity; however, the mechanism of action remains unknown. The strongest finding was that exercise improved depression. Biddle

(1995) found the same results as Scully and colleagues (1998) in that individuals with clinical depression improved the most with exercise. The ability of exercise to improve self-esteem was also strong. This seemed to be through improving feelings of self-efficacy. Biddle (1995) concluded that exercise had a positive effect on mood as measured in the studies reviewed, but that these studies had significant flaws similar to those identified by Hughes (1984).

Other reviews come to similar conclusions regarding the effect of exercise on psychosocial health. Dishman (1995) starts with the conclusion that methodological flaws are rampant in the literature. This hampers the ability to draw strong conclusions about exercise's effect on psychosocial well-being. Dishman (1995) also raises the problem of expectancy or the 'feel good' effect among study participants. Dishman (1995) concluded that depression and self-efficacy seem most reactive to exercise with small effects of exercise on anxiety reduction.

A study looked at the association of exercise and both physiological and psychosocial health (Hammermeister, Page, & Dolny, 2000). These investigators looked at 121 men and women aged 24-63 years at different stages of adoption of exercise, from individuals who were not even considering exercising to those who had exercised regularly for more than six months. Regular exercise was associated with fewer cigarettes smoked ($F = 2.87$, $p = 0.04$), fewer work absences ($F = 2.59$, $p = 0.05$), and less depression ($F = 8.04$, $p = 0.0001$). However, exercise was not associated with lower dietary fat consumption, anxiety, loneliness, psychological stress, and alcohol consumption. Therefore, although exercise may be associated with some features of well-being; exercise cannot necessarily be used as a marker of global well-being. An

interesting finding in that study was that dietary fat and exercise were inversely associated ($p = 0.06$) when women were analysed separately from the male subjects, lending strength to the argument that amongst women, exercise and eating behaviour are linked.

Factors that mediate the relationship between exercise and health have been investigated. Two such factors are motivation for exercise and the specific exercise activity undertaken. Exercise motivation has already been discussed (section 6, ii). Daley and Buchanan (1999) investigated the self-perceptions of 113 female adolescents (15-16 years old) and took into consideration the socio-cultural context in which these adolescents lived and what exercise activities they undertook. These authors hypothesized that aerobics participation would improve self-perceptions because it would not compromise feelings of femininity, in fact it would improve femininity by leading to thin, fit bodies. Aerobics is primarily a recreational, rather than a competitive activity. Also, aerobics provided social interaction and satisfied the desire to do something good for oneself. The self-perception scores for the students who attended aerobics were compared to those who attended a regular physical education (P.E.) class. The adolescents who attended aerobics experienced improved self-perception over the P.E. students. The authors concluded that any positive psychological health outcomes with exercise may not be due to the exercise itself but rather due to the type of activity performed and whether that activity helps individuals satisfy gender-roles.

Running is a specific exercise activity that has been investigated in association with disordered eating. There is some controversy as to whether running is associated with a high rate of eating disorders and studies have found mixed results (Ryujin,

Breaux, & Marks, 1999). One possible explanation for the different results may be level at which the women run (Ryujin et al., 1999). Ryujin and colleagues (1999) noticed that the runners involved in these studies were often labelled as exercise dependent or elite runners. Exercise dependence/addiction has already been herein discussed and there is considerable evidence that exercise dependence may be associated with poorer well-being. However, it is rare that elite athletes are compared to individuals who exercise at lesser competitions. The study by Ryujin and colleagues (1999) did separate out elite athletes and investigated the eating disorder symptomatology amongst college athletes who had not competed at the national or international level. Twenty collegiate runners were compared to a control group of 35 undergraduate women. The runners had significantly lower scores for the Drive for Thinness ($p < 0.05$), Bulimia ($p < 0.05$), and Body Dissatisfaction ($p < 0.001$) subscales of the Eating Disorder Inventory. Unfortunately the researchers did not determine the individuals' BMI and did not control for group differences in BMI. This is unfortunate as BMI can have a substantial influence on Eating Disorder Inventory scores. Also the researchers did not question controls as to whether they were exercise addicted nor if they competed at other sports. Therefore, conclusions from this study must be made with caution.

v. Exercise and Body Image

Hypotheses regarding the effect of exercise on body image predict both positive and negative relationships. As exercise can lead to weight change and an increase in muscle tone, thus approaching the thin, fit ideal, exercise may be associated with improved body image (Davis & Fox, 1993). However, exercise can focus attention on

the physique and its dissonance with the cultural ideal, thus leading to greater body dissatisfaction (Davis & Fox, 1993). Body image was not improved with habitual aerobic exercise in the studies reviewed by Hughes (1984). However, the results are difficult to apply to non-clinical populations as the studies reviewed only included psychiatric patients (Hughes, 1984).

Davis and Cowles (1991) investigated the body image of 88 men (mean age 28.5 ± 11.6 years) and 112 women (mean age 23.5 ± 8.6 years) who exercised at varying intensities and frequencies. Eighty percent of the women wanted to lose weight and were dissatisfied with their bodies. Although approximately the same percentage of men reported a desire to change their weight, they were less dissatisfied with their bodies. The women also reported greater body focus and reported that body dissatisfaction more greatly influenced their overall well-being. Exercise intensity and duration were not correlated with improved body image among women. Unfortunately, a non-exercising group was not included in the study so it is not known whether body dissatisfaction would be different among non-exercising women. However, the authors hypothesized that perhaps exercise was associated with such great body dissatisfaction among the participants because women who place greater importance on appearance are more likely to exercise.

A study by Frederick and Shaw (1995) that included both qualitative and quantitative methods provides support for this hypothesis. In that study 190 undergraduate women (mean age 22 years) who attended aerobics classes reported that body image concerns motivated them to attend aerobics classes and at the same time negatively impacted their enjoyment of the activity. These women represent a group

who place great importance on appearance, driving them into aerobics classes despite a lack of enjoyment for the classes.

Davis and Fox (1993) included in their investigation a non-exercising group of women that enabled them to compare body image across exercise habits. These authors investigated the differences in body dissatisfaction among non-exercising women, moderately exercising women, and excessively exercising women, who were recruited from a university and from fitness clubs (n = 351, mean age 28.7 years). Among these women, body dissatisfaction was inversely correlated with and body focus directly correlated with exercise activity. In other words, excessive exercisers were more satisfied with and more focused on their bodies. Excessive exercise was defined as one or more hours of exercise at least six times per week. Although these authors labelled this group "excessive" exercisers, this exercise schedule is not atypical for many exercisers, either recreational or competitive.

Conversely, another study that compared body image between non-exercising and competitively exercising women did not find greater body satisfaction with exercise (Hallinan, Pierce, Evans, & DeGrenier, 1991). In this study, no difference in body dissatisfaction was found between 52 non-exercising and 65 female intercollegiate varsity athletes (mean age 19.1 $\pm$ 1.5 years). Both groups were dissatisfied with their bodies.

A third study by Koff and Bauman (1997) looked at differences in body dissatisfaction between female college students aged 18 to 22 years enrolled in either recreational fitness classes (n = 60) or recreational sport skills classes (n = 47). The fitness classes included strength training and activities aimed at improvement in

cardiovascular fitness (e.g. step aerobics). The sport skills classes focused on skill improvement and game play for racquet sports. Students enrolled in fitness classes experienced an improvement in body dissatisfaction, whereas, those in sports skills classes did not experience a change in body dissatisfaction. This finding contradicts those of exercise motivation research where individuals motivated for exercise by body-appearance related factors are less satisfied with their bodies (Frederick & Ryan, 1993).

Harris (2000) measured the body-size dissatisfaction of 107 female tennis competitors from colleges across the United States. The mean score for current appearance was 3.4 ± 0.9 which was significantly larger than the mean ideal score of 2.8 ± 0.5 ($p < 0.01$). Interestingly the mean score for the athletes' perception of the healthiest weight was 3.2 ± 0.5 which was significantly larger than the ideal score. Obviously a healthy weight was not what these women considered to be an ideal weight.

A recent intervention trial investigated the impact of a circuit-weight training program on several measures of body image and the social physique anxiety of male and female college students (Williams & Cash, 2001). Thirty-nine students (27 women and 12 men) participated in a six-week circuit-weight training program while a matched control group waited on a waitlist. The students who participated in the exercise program experienced improved scores on all of the body experience measures, the Social Physique Anxiety Scale ($p < 0.05$), the Perceived Physical Ability subscale of the Physical Self- Efficacy Scale ($p < 0.001$), the Appearance Evaluation subscale ($p < 0.02$), and the Body Area Satisfaction Scale ($p < 0.001$) of the Multidimensional Body-Self Relations Questionnaire. Also the exercisers' scores were significantly better than

the students who did not exercise for Appearance Evaluation ($p < 0.05$), the Body Area Satisfaction Scale ($p < 0.01$), and the SPAS ($p < 0.02$).

As seen in the conflicting results of past studies, the relationship between exercise and body image is not well understood. Possible mediating or moderating factors involved in this relationship include participant gender, motivation for exercise, exercise activities undertaken, and intensity of exercise schedule. The study by Williams and Cash (2001) lends support to this idea as the individuals who were motivated for the circuit-weight training by appearance/weight management had poorer body experience scores initially ($p < 0.01$). Also those students who were motivated by socializing experienced a greater reduction in social physique anxiety than those motivated by other reasons ($p < 0.05$)[Williams & Cash, 2001].

vi. Exercise and Social Physique Anxiety

Social physique anxiety correlates with many factors related to exercise. These factors include: commitment to physical activity, attitude towards exercise, motivation or reasons for physical activity, location of activity, and specific exercise activities undertaken. (Crawford & Eklund, 1994; Eklund & Crawford, 1994; Finkenberg et al., 1998; Frederick & Morrison, 1996; McAuley et al., 1995; Spink, 1992).

Finkenberg and colleagues (1998) found that college female athletes ($n = 108$, mean age 19.6 years) had lower social physique anxiety than non-athletes ($n = 150$, mean age 19.6 years). Similar results were found amongst postmenopausal women ($n = 164$, mean age 66.3 ± 7.3 years) [Ransdell et al., 1998]. In that study, women with low and moderate leisure time physical activity (defined as less than 2000 kcal per week of

energy expenditure) had significantly higher ($p < 0.001$) social physique anxiety than women with high leisure time physical activity (≥ 2000 kcal per week)[Ransdell et al., 1998]. In a larger sample there was the same inverse relationship between exercise and social physique anxiety for men but not for women (Lantz, et al., 1997). Participants in that study included 300 men and women aged 25.7 ± 9.7 years (Lantz et al., 1997). The relationship reached statistical significance amongst male participants ($r = -0.26$, $p < 0.0038$) but not amongst female participants ($r = -0.12$, $p > 0.05$) [Lantz et al., 1997]. In another study, thirty-five male, experienced bodybuilders (mean age 27 ± 4 years) and 23 male, experienced weightlifters (mean age 28 ± 3.5 years) had less social physique anxiety than 31 inexperienced bodybuilders (mean age 25 ± 4 years) [Hurst, Hale, Smith, & Collins, 2000]. The experienced athletes had at least one year of training and the inexperienced athletes had less than one year of training (Hurst et al., 2000). From these combined results it appears that social physique anxiety may be negatively associated with exercise participation. However, a conflicting study found a weak positive association ($r = 0.16$, $p < 0.05$) between SPA and exercise activity as measured by the Godin Leisure Time Exercise Questionnaire (Kowalski, Crocker, & Kowalski, 2001). That study included 354 female university students aged 20.25 ± 1.7 years with a variety of exercise habits (Kowalski et al., 2001).

Exercising women with higher social physique anxiety chose different locations for exercise and different exercise activities in an investigation by Spink (1992). Spink (1992) found that among 37 female university students (age range 17 – 19 years), those with greater social physique anxiety were more likely than those with lower social physique anxiety, to choose to exercise in private. The high social physique anxiety

group was also more likely to exercise in private than the Canadian standard for this age group (Spink, 1992). Frederick and Morrison (1996) also found that social physique anxiety was associated with the choice of exercise activity. Among university men and women (n = 326, mean age 20.6 years), those with higher social physique anxiety were more likely to participate in fitness activities (e.g. exercise machines) than sports (e.g. football, tennis) at the recreational level (Frederick & Morrison, 1996).

vii. Exercise and Dietary Restraint

Dietary restraint may be positively associated with exercise. This association between competitive exercisers and disordered eating has been suggested due to many reasons including the desire to perform well when in the public eye and the belief that losing weight will improve athletic performance (Harris, 2000). A study by Beals and Manore (2000) found that a significant number of women athletes had subclinical eating disorders. Of the 65 women screened for the study, 25 displayed subclinical eating disorders which included reported restrained eating behaviour (Beals & Manore, 2000). A second study by Lauder and Campbell (2001) found similar results amongst a population of college women belonging to the military reserves who must exercise in order to meet fitness requirements. Twenty percent of the sample was determined to be at risk for developing eating disorders. To be at risk the women had to report using high risk weight loss behaviours, such as diet pill use and score higher than the mean scores provided in the manual of the Eating Disorder Inventory. The proportion (20%) of this physically active study population at high risk for developing eating disorders is much greater than findings of one to three percent at risk in the general population (Diagnostic

and Statistical Manual of Mental Disorders, Ed. IV, as cited in Lauder & Campbell, 2001).

One study has specifically found an association between restrained eating and exercise for women. In a study of 62 female university students aged 20 - 35 years, reported weekly exercise activity was greater among the high dietary restraint group than the low dietary restraint group (McLean et al., 2001). This study used the TFEQ to measure dietary restraint. The socio-cultural context of North American women's lives support this result as this culture teaches women to exercise and limit food intake in order to attain the thin, fit ideal body (Bartky, 1988).

viii. Exercise Measurement

Many methods exist to measure exercise activity. Electrical and mechanical measurement devises are expensive and tend to alter participant exercise behaviour (Godin & Shephard, 1985). Questionnaires are less expensive but often are lengthy and difficult to complete (Godin & Shephard, 1985). The studies that I have herein reviewed use a variety of these methods to measure exercise. This problem with measurement may help account for the varied study findings.

The Godin Leisure-Time Exercise Questionnaire was developed to classify people into usual or typical activity categories and investigate this classification in association with psychosocial variables (Godin & Shephard, 1985). The self-administered questionnaire was designed to be easy and quick to complete (Godin & Shephard, 1985). The Godin Leisure-Time Exercise Questionnaire has been found to have good test-retest reliability in several studies with populations ranging from fifth

grade children to middle aged adults (Godin, Jobin, & Bouillon, 1986; Godin & Shephard, 1985; Jacobs Jr., Ainsworth, Hartman, & Leon, 1993; Sallis, Buono, Roby, Micale, & Nelson, 1993). The two week test-retest reliability was 0.64 in a study of 29 men with a mean age of 38.8 years (Godin et al., 1986). Godin and Shephard (1985) found a higher two week test-retest reliability score of $r = 0.74$ among 53 men and women ranging in age from 18 to 65 years. In a similar sample population of 28 men (mean age 37.2 ± 10 years) and 50 women (mean age 37.4 ± 9.7 years), Jacobs Jr. and colleagues (1993) found the thirteen month test-retest reliability to be 0.62. Finally, Sallis and colleagues (1993) found the two week test-retest reliability of the questionnaire to be 0.81 for 102 grade five, eight, and eleven students.

Jacobs Jr. and colleagues (1993) concurrently validated a number of questionnaires against a variety of fitness measures including body fatness, vital capacity, treadmill exercise performance, and four-week physical activity records. Scores on the Godin Leisure-Time Exercise Questionnaire correlated with other measures of physical activity as well as more detailed and lengthy questionnaires (Jacobs Jr. et al., 1993). Godin and colleagues (1986) also tested the questionnaire for concurrent validity against maximum oxygen uptake, body fat, and muscular endurance. The questionnaire correctly ($p < 0.05$) classified subjects into high or low exercise categories. The authors concluded that the questionnaire was a reliable, valid and simple method for assessing overall level of habitual exercise.

ix. Conclusion

The relationship between exercise and health, particularly psychosocial health, is not a simple one. Conclusions from the literature are mixed; however, exercise does seem to have a small to moderate positive effect on several parameters of psychosocial health, such as depression. There are flaws in many studies that impair the ability to draw strong conclusions. The accurate measurement of exercise activity also remains difficult. There remains a strong belief that exercise makes one feel better. This 'feel good' effect may be the true cause for the improvements in psychosocial health with exercise. Therefore, the effects of exercise on health cannot be examined without evaluating the socio-cultural context within which people live.

7. Qualitative Studies

Qualitative research can add depth to the understanding of people's experiences. It can also be used to explore relationships, discovering where there is a need for quantitative research. The qualitative work by Chapman (1997; 1999) investigated women's experiences with health, eating, and their bodies. Chapman's (1997; 1999) work is of particular relevance to the present investigation because she included women living in British Columbia and one study included members of a UBC varsity athletic team. In one study, Chapman (1999) interviewed seventeen women aged 28 to 50 years. Those women stated that in order to lose weight they "watched what they ate" and exercised. "Watching what you eat" included eating foods perceived as healthy and restricting the intake of fat, dessert, alcohol, junk food, sugar, salt, meats, and fast food. "Watching what you eat" is very similar to the construct of restrained eating. Exercise

was also perceived as central to the achievement of weight loss. The women talked about "watching what they ate" and exercising as ways to control their bodies (Chapman, 1999). Weight control was identified as being healthy, supporting the hypothesis that women equate thinness with fitness and with health. For these women, weight and appearance were the main motivators for this "healthy" lifestyle (Chapman, 1999).

In a second study, Chapman (1997) interviewed eight women aged 20 to 26 years, who belonged to a competitive lightweight rowing team. Although these women were undertaking food restriction and exercise for competitive purposes, they mentioned the positive effects of their behaviour to include attractiveness and femininity (Chapman, 1997). After the end of the training season, some of the women reported discontent with their now heavier and less muscular bodies (Chapman, 1997). Those women expressed the desire to regain the low body fat look in order to regain the self-esteem that was provided by that attractive (i.e. thinner, fitter) body (Chapman, 1997). Recognizing the impact that having a thin, fit body had on these women, and the limitations of the small sample, Chapman (1997) recommended further exploration into the weight management experiences of female athletes.

8. Summary

As has been explained by objectification theory and found in both qualitative and quantitative studies, within the socio-cultural context of North America there exists a complex relationship among food attitudes, exercise, and women's experiences with their bodies. This complex relationship may determine whether exercise has a positive or

negative effect on an individual's overall health. It is known that physical activity can lead to physiological and potentially psychosocial health promotion, but that exercise may be associated with potentially harmful behaviours (e.g. restrained eating). Therefore, there is a need to be able to identify which individuals may be at risk for the potentially harmful effects of exercise. This is necessary in order to promote physical activity in such a way that the positive health benefits are realized and any negative impact minimized.

CHAPTER III

METHODS

1. Study Design

The present study is a cross-sectional quantitative survey. This design does not allow for the determination of cause and effect (Domholdt, 1993). Alternatively, such a study design aims to document relationships among a number of variables (Domholdt, 1993). The primary variables of interest included habitual exercise behaviour, social physique anxiety, body-size dissatisfaction, and restrained eating. Self-reported body mass index (BMI) was calculated. Including an assessment of body mass index was recommended by Gupta, Chaturvedi, Chandarana, and Johnson (2001) to control for BMI's possible effects on body-size dissatisfaction measurement. Exercise motivation was also investigated to determine whether motivational factors for exercise differ between recreationally and competitively exercising women and whether exercise motivation is associated with food attitudes or the measures of these women's feelings about their bodies.

2. Subjects

The study was approved by the University of British Columbia Behavioural Sciences Screening Committee before subjects were recruited (Appendix 2). This study consisted solely of female participants, as the socio-cultural context differs for men and women in North America. There are differences that exist between the sexes in exercise,

body image, and eating habits; therefore, investigations need to separate male and female participants. Study participants were aged 19 and over and attending The University of British Columbia (UBC). The study excluded participants either previously or presently diagnosed with eating disorders. Recruitment flyers, campus paper advertisements, and in person recruiting stated that participants must not have been diagnosed with or treated for an eating disorder (Appendix 3). Also, questionnaires had an initial page that inquired about eating disorder treatment and diagnosis, again asking those who had been either previously or presently diagnosed with eating disorders not to complete the questionnaire (Appendix 4).

Three subject groups were included in this investigation. The first was the non-exercising group that consisted of individuals who did not plan exercise into their day, reported no strenuous exercise, and indicated that they never or rarely engaged in activity that caused them to work up a sweat. This group of non-exercising women was included in order to determine whether women who exercise are different from non-exercising women with respect to food attitudes, body-size dissatisfaction, and social physique anxiety. Women who did exercise were separated into two groups, recreationally exercising and competitively exercising. The recreationally exercising group consisted of individuals who planned exercise into their day but did not participate in competitive sports or belong to University of British Columbia intramural teams. Individuals who exercised recreationally and participated in intramural activities were excluded as many intramural activities have an element of competition. The third subject group, competitive exercisers, consisted of those respondents who reported belonging to University of British Columbia competitive sports teams or who

participated in competitive activities outside of the university setting. This grouping of recreational versus competitive exercisers assumes that those women who compete on varsity teams are motivated for exercise, at least in part, by competition. A question regarding exercise motivation helped to determine whether varsity athletes did in fact report being motivated for exercise by competition more than recreationally exercising women.

3. Data Collection

i. Recruitment

Participants were recruited through advertisements in campus newspapers and flyers placed throughout the campus (Appendix 3). A second flyer was developed to specifically recruit non-exercising women, as this group was not responding to the original flyer (Appendix 3). Interested individuals were instructed to pick up a questionnaire package at the reception desk in the Family and Nutritional Sciences Building or contact the investigator via pager for more information. All recruitment media stated that study participants could enter a draw to win a cash prize of $100, $50, or $25.

Varsity team coaches were contacted via letter followed up by a phone call (Appendix 5). Several teams invited the investigator to come to a team meeting or practice to recruit individuals. The teams visited included the swim, ice hockey, track and cross-country running, volleyball, basketball, and golf teams. Individuals were able to pick up questionnaires at that meeting. The varsity rugby team coach indicated that he would mention the study to his team members.

The investigator contacted class instructors from a variety of disciplines, such as English, Biochemistry, and Sociology, via email followed by a phone call asking to make a recruitment announcement. The announcement was for the recruitment of non-exercising women and included all information on the flyers. Individuals were able to pick up questionnaires from the investigator at the time of the announcement.

Power calculations at 80 percent power to detect a standard medium effect size for both the TFEQ and the SPAS at $\alpha = 0.05$ produced the necessity for a group size of 52 participants (Portney & Watkins, 1993). Subjects were grouped according to responses to questions in the questionnaire (Appendix 6). Subjects were recruited until at least 52 questionnaires per exercise group were returned. Consent was assumed with subject completion and return of the questionnaire. An explanatory letter included with the questionnaire stated this for the participants (Appendix 7).

ii. Questionnaire Package

Questionnaire packages contained an explanatory letter (Appendix 7), a one page questionnaire asking for individuals diagnosed with, or treated for an eating disorder to not complete the package (Appendix 4), the questionnaire itself (Appendix 6), an optional page to enter the participant in the cash draw (Appendix 8), and a self-addressed stamped envelope. The questionnaire included: the Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985); questions regarding exercise including motivation for exercise; the SPAS (Hart et al., 1989); the Contour Drawing Rating Scale (Thompson & Gray, 1995); the TFEQ (Stunkard & Messick, 1985); and, demographic questions (Appendix 6).

At the time that an individual picked up a questionnaire, a form asking for a mailing address was filled out in order to send the participant a reminder postcard (Appendix 9). If a questionnaire was not received one month after being picked up, a reminder postcard was sent to the participant (Appendix 10). Questionnaires (Appendix 6) and address forms (Appendix 9) were coded by matching four digit numbers in order to identify unreturned questionnaires and send reminder postcards. Winners of the cash prizes were contacted via the information given on the entrance form (Appendix 8). Winners' social insurance numbers were collected in order to process prize money through the University of British Columbia. The address forms (Appendix 9) were also used to mail a summary of the study results to participants who indicated that they wanted one sent to them (Appendix 11).

iii. Height, Weight, and Body Mass Index (BMI)

Self-reported height and weight were recorded by study participants. Self-reported height and weight are prone to small errors in estimation (Rowland, 1990). Specifically, height tends to be overreported and weight underreported, leading to small errors in weight for height calculations such as body mass index (Rowland, 1990). Larger differences between self-reported and measured data were seen among individuals in the largest quartile for both height and weight, in a study by Fortenberry (1992). Fortenberry (1992) determined that overall the difference between self-reported and measured data was small and self-report measures were appropriate for surveys targeting females aged 14 to 20 years (Fortenberry, 1992).

Subjects' body mass index (BMI) was calculated from self-reported height and weight. BMI is the subject's weight in kilograms divided by height in meters squared (wt/ht^2). It is the most common measure of relative body weight and is used as a marker for obesity (Nies, Cook, & Hepworth, 1999; Tiggemann, 1994). What the BMI fails to determine is the tissue make-up of an individual's weight; therefore, it cannot be determined whether fatty or lean tissue make up the bulk of an individual's BMI. BMI can be associated with social physique anxiety (Crawford & Eklund, 1994; Eklund & Crawford, 1994; Hart et al., 1989; McAuley et al., 1995; Spink, 1992); body image (Tiggemann, 1994); and dietary restraint (Gorman & Allison, 1995).

iv. Exercise Measurement

Several unvalidated questions were used to inquire about participants' exercise habits. The purpose of these questions was to classify participants into non-exercising, recreationally exercising, and competitively exercising subject groups. The first question asked participants whether they plan exercise into their day. This question separated the non-exercising group (those who answered no) from the other two exercising groups. The next question inquired about motivation for exercise. This question was used to determine whether motivational factors for exercise differed between the recreationally and the competitively exercising groups and whether motivation for exercise was associated with SPAS, TFEQ, and body-size dissatisfaction scores. The third question asked participants to list type(s) of exercise activities in which they participated. The following two questions asked whether participants belonged to University of British Columbia varsity teams or participated in competitive

sports outside of the university, in order to differentiate between recreationally and competitively exercising participants. The last question inquired about participation in intramural sports. If participants did not exercise competitively and did participate in intramural sports they were excluded from the study.

The Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985) was used to determine the frequency and intensity of habitual exercise activity undertaken by study participants. A question regarding duration of exercise activities was added to the Godin Leisure-Time Exercise Questionnaire. This question about duration of exercise was added in order to determine the amount (frequency and duration) of habitual exercise, to confirm that participants were classified into the appropriate exercise groups.

v. Three Factor Eating Questionnaire

The TFEQ was used to assess dietary restraint, disinhibition, and hunger (Stunkard & Messick, 1985). The version of the TFEQ used in the study is a modified version. Question 1 originally stated: "When I smell the aroma of a sizzling steak, I find it very difficult to keep from eating, even if I have just finished a meal". As a portion of the target population may not eat steak, the question was changed by McLean (1999). The question replaced "a sizzling steak" with "my favourite food". McLean (1999) pretested this version of the questionnaire and used the modified version in her investigation involving a similar target population as the present study.

vi. Body-Size Dissatisfaction

The Contour Drawing Rating Scale asks respondents to select the drawing that corresponds most closely to their perceived current body size and to their perceived ideal body size (Thompson & Gray, 1995). A question was added to the Contour Drawing Rating Scale. The question inquires about how much the difference between current and ideal figures (if such a difference exists) concerns or bothers the respondent. This question is a Likert-type question that attempts to obtain just how dissatisfied the respondent is with her perceived difference between her current and ideal figures.

vii. Social Physique Anxiety Scale

The Social Physique Anxiety Scale assesses the amount of anxiety that an individual experiences from the belief that others are observing and negatively evaluating her physique (Hart et al., 1989). In the original version of the SPAS a question asks " I **never** worry about wearing clothes that might make me look too thin or overweight" (Hart et al., 1989). Recently it has been suggested that the question be revised to read "I worry about wearing clothes that might make me look too thin or overweight" to eliminate the double negative in the original version of the question (Eklund et al., 1997). The surveys in the present investigation were first printed using the original version of the SPAS; however, upon noting this recommended revision, subsequent surveys were edited to contain the revised question.

4. Data Analysis

i. Normality Testing

All data analysis was performed using SPSS 10.0 (SPSS Inc., 2000). First, study variables were tested for normality using Kolmogorov-Smirnov and Shapiro-Wilk tests, with a p-value greater than or equal to 0.05 identifying normal distributions. If distributions were normal, parametric tests were used. If distributions were not normal, they were logarithmically ($\log_{10}$) transformed and again tested for normality. If the log transformation was normally distributed, it was used in subsequent parametric analyses. If the log transformation was still not normally distributed, non-parametric tests were used to analyse the original distribution.

ii. BMI and Age

BMI and age were tested for normality and differences in exercise group means were tested. Neither BMI nor age were different among exercise groups, therefore, they were not used as covariates in subsequent analyses.

iii. Exercise

Exercise group total weekly leisure time exercise activity was calculated according to the Godin Leisure-Time Questionnaire instructions, with the addition of duration of activity, and reported as mean ± standard deviations. Exercise activity was quantified by multiplying the minutes per session by the number of sessions per week by

an intensity factor. Strenuous exercise activity had an intensity factor of 9, moderate activity a factor of 5 and, mild activity a factor of 3. The distributions for strenuous, moderate, mild, and total exercise activity were determined not to be normal; however, the log transformations were normally distributed and used in analyses. Differences in exercise activity were determined among exercise groups by ANOVA and Tukey's Post Hoc analyses using the log transformations of the data. Pearson's and Spearman's correlation coefficients and scatterplots were used to determine whether the log transformation of exercise activity was linearly correlated with other study variables.

Up to four exercise activities were recorded for individuals in the recreational and competitive groups. Frequencies of each exercise activity were reported. Wilcoxon tests were used to determine whether recreational and competitive exercisers reported different frequencies of each exercise activity.

The top three motivations for exercise, as reported in question 6 of part I of the questionnaire (Appendix 6), were recorded for recreational and competitive exercisers. Pearson χ^2 test of independence, determined whether the two exercise groups differed in their motivation for exercise. As only primary motivation differed between the exercise groups, analyses were undertaken to determine whether it was associated with other study variables.

iv. Body-Size Dissatisfaction

Scores for the Contour Drawing Rating Scale were calculated in two ways. In the literature the scale is traditionally calculated by taking the absolute value of the difference between individuals' current and ideal body sizes. However, it seems logical

that women who wish to be larger than they are currently may differ from women who wish to be smaller than their current size; therefore, we also calculated scores without taking the absolute value. For this new method, scores could be positive or negative; whereas, in the traditional method scores were only positive.

As no measure of body-size dissatisfaction was normally distributed, Mann-Whitney tests were used to determine whether exercise group differences existed. Wilcoxon tests were used to determine between which groups the differences lay. Spearman's correlation coefficients were used to determine whether there was a statistically significant linear correlation between body-size dissatisfaction and other study variables. These relationships were also plotted on scatterplots in order to visually evaluate the relationships.

v. TFEQ and SPAS

TFEQ subscale scores (dietary restraint, disinhibition, and hunger) and SPAS scores were calculated according to directions (Hart et al., 1989; Stunkard & Messick, 1985). Group means ± standard deviations were reported along with results of normality testing. To determine whether the exercise groups differed in TFEQ or SPAS scores, ANOVA was used for normally distributed variables and the Mann-Whitney test was used for non-normally distributed variables. Tukey's Post Hoc analyses were used to analyze differences in normally distributed variables amongst the exercise groups. For non-normally distributed variables, the Wilcoxon test was used to analyze differences amongst the exercise groups. Pearson's correlation coefficients (normally distributed data) and Spearman's correlation coefficients (non-normally distributed data) were used

to determine whether there was a statistically significant linear correlation between SPAS score and TFEQ scores with other study variables. These relationships were also graphed as scatterplots to visually determine whether an association existed. Analyses were conducted for both the 12-item and 9-item versions of the SPAS. However, no differences were found; therefore, results for the 12-item version are reported to enable comparisons with other studies' results.

vi. Regression Analysis

In order to determine whether any combination of variables could predict dietary restraint, total TFEQ score, or total exercise activity, regression analyses were performed for the pooled population and within individual exercise groups. Both stepwise and backwards methods were used and agreement was sought between the two methods to determine prediction equations. As stepwise regression is more conservative (with a level of significance for removal of $p \leq 0.05$), its results are reported herein.

Separate analyses were performed for log transformations and the original versions of variables for which log transformation resulted in normal distributions. Two variables were altered for use in the regression analyses. The original version of primary exercise motivation could not be used, as it is a categorical variable. Therefore, weight loss/maintenance was singled out and from it a dichotomous variable was created. Individuals who ranked weight loss/maintenance as their primary motivation for exercise were assigned a score of "1". Individuals who chose another motivator were assigned a score of "0". The other altered variable was the question regarding concern with the difference between an individual's current and ideal body size. The original variable used a score of "6" to indicate that there was no difference between current and ideal

score, therefore, the individual could not be concerned with a difference. For the purpose of regression this was scored as "0" so that the analysis would not treat the score of "6" as a larger concern than a score of "5".

CHAPTER IV

RESULTS

1. Demographics

i. Response

Two hundred forty-seven questionnaire packages were picked up or mailed, of which 198 were returned and included in the analysis. A further five questionnaires were returned after group sizes were attained and were not included in the analysis. Therefore, the return rate was 203/247 or 82%. Of the 198 questionnaires that were returned in time for analysis, 166 could be categorized into the three exercise groups. Thirty-two questionnaires were returned but could not be categorized into one of the three exercise groups. Seven individuals were recreational exercisers who participated in intramural sports and were not included in analyses. One individual was not a UBC student and one individual returned a questionnaire with most pages blank including questions used to categorize individuals into the exercise groups. Finally, 23 questionnaires were completed by individuals who indicated that they did not plan exercise into their day, yet on the Godin Leisure Time Exercise Questionnaire they reported strenuous exercise or indicated that they sometimes engaged in activity to work up a sweat. This group was called the high non-exercisers and separate analyses were performed to identify if they differed from non-exercisers on any of the variables in question.

There were 52 competitively exercising, 61 recreationally exercising, and 53 non-exercising women. However, not all questions were answered by all individuals; therefore, sample sizes for individual analyses will follow. The competitive exercising

group consisted of 40 women who competed as members of UBC varsity teams and 12 women who competed only in activities outside of UBC. However, several women reported competing as both UBC varsity team members and in activities outside of UBC. The varsity teams that women belonged to were ice hockey (n = 16), basketball (n = 5), cross-country & track (n = 5), volleyball (n = 4), golf (n = 4), swim (n = 5), and martial arts (n = 1). The activities that women competed in outside of UBC were basketball (n = 3), running (n = 2), volleyball (n = 1), golf (n = 1), swimming (n = 5), tennis (n = 1), martial arts (n = 1), triathlons (n = 2), and other activities (n = 8).

ii. Age

Two recreational exercisers did not give valid ages and were left out of analyses. The mean age of respondents was 21.7 ± 3.6 years (mean ± standard deviation). There were no differences in age among the exercise groups (see Table 1). Ages ranged from 19 years (the lower cut off value) to 41 years; however, the majority (75%) of respondents were between the ages of 19 and 22 years.

iii. Body Mass Index (BMI), Height, and Weight

Every participant reported her height and weight; therefore, all participants were included in the BMI analyses. Table 1 presents data on height, weight, and BMI by exercise group. BMIs ranged from 16.2 to 28.3 kg/m^2. BMI had a skewed distribution (Kolmogorov-Smirnov 0.080, p = 0.049). There was no difference in mean BMI among the exercise groups.

Although there were no differences in BMI among the exercise groups, there were differences among the groups for height and weight. Weight was normally distributed (Kolmogorov-Smirnov 0.062, $p \geq 0.200$), but height was not normally distributed (Kolmogorov-Smirnov 0.088, $p = 0.021$). The competitive athletes were significantly taller than the recreational group and taller and heavier than the non-exercising group. The recreational exercisers were significantly taller than the non-exercisers. The median and mode for height were both 1.68 m and heights ranged from 1.50 m to 1.85 m. Weights ranged from 39.9 kg to 83.9 kg.

Table 1: Mean Age, BMI, Height, and Weight of Competitive, Recreational, and Non-Exercising Women

					Non-Parametric Tests	
Variable	Competitive (n = 52)	Recreational (n = 61)	Non-Exercising (n = 53)	Total Population (n = 166)	Chi-Square	P-Value
Age (years)	21.4 ± 3.1[a]*	21.8 ± 3.3[a]	22.0 ± 4.4[a]	21.7 ± 3.6	2.324	0.313
Height (m)	1.71 ± 0.07[a]	1.67 ± 0.08[b]	1.63 ± 0.07[c]	1.67 ± 0.08	17.630	<0.001
BMI (kg/m^2)	21.2 ± 1.8[a]	21.5 ± 2.7[a]	20.7 ± 2.6[a]	21.1 ± 2.4	2.949	0.229
					Parametric Tests	
					F	P-Value
Weight (kg)	62.5 ± 8.1[a]	59.8 ± 9.4[a,b]	55.2 ± 9.6[b]	59.2 ± 9.5	8.713	<0.001

* Mean ± standard deviation

[a, b, c] Means in the same row with different subscripts are significantly different at $p<0.05$

2. Exercise

i. Amount of Exercise Activity

All study participants completed the Godin Leisure Time Exercise Questionnaire; therefore, all are included in the following analyses. Distributions for strenuous exercise, moderate exercise, mild exercise, total exercise activity, and how often people reported engaging in activity to make them sweat were all significantly different from normal (strenuous Kolmogorov-Smirnov 0.269, $p < 0.001$; moderate Kolmogorov-Smirnov 0.238, $p < 0.001$; mild Kolmogorov-Smirnov 0.214, $p < 0.001$; total Kolmogorov-Smirnov 0.183, $p < 0.001$, sweat question Kolmogorov-Smirnov 0.281, $p < 0.001$). Strenuous, moderate, mild, and total exercise were all normally distributed when log transformed (strenuous Shapiro-Wilk 0.974, $p = 0.524$; moderate Shapiro-Wilk 0.950, $p = 0.097$, mild Shapiro-Wilk 0.974, $p = 0.538$; total exercise Shapiro-Wilk 0.985, $p = 0.905$).

The three exercise groups reported significantly different exercise activity from one another. Table 2 summarizes the mean exercise scores per exercise group. Overall, the competitive exercisers did the most exercise, followed by recreational exercisers, and non-exercisers reported the least amount of exercise. The competitive exercisers participated in significantly more strenuous exercise than either the recreational exercisers or non-exercisers. Recreational exercisers did not report significantly more strenuous exercise than non-exercisers who by definition reported zero strenuous exercise. Recreational and competitive exercisers participated in similar amounts of moderate exercise. However, the non-exercisers reported significantly less moderate exercise than both the competitive and recreational exercisers. For mild exercise,

competitive exercisers did not report different habits than the other two groups but recreational exercisers did report more mild exercise than the non-exercisers. In response to the question "How often do you engage in regular activity long enough to work up a sweat?" competitive exercisers indicated sweating significantly more often than recreational exercisers who reported sweating significantly more often than non-exercisers (Table 2).

Table 2: Mean Exercise Per Week Measured By The Godin Leisure Time Exercise Questionnaire[1] for Competitively, Recreationally, and Non-Exercising Women

Variable	Competitive (n = 52)	Recreational (n = 61)	Non-Exercising (n = 53)	Total Population (n = 166)	F	P-Value
Strenuous Exercise[2]	3348.8 ± 2665.2*	652.8 ± 685.3	0.0	1288.9 ± 2094.5		
Log Strenuous Exercise[Ψ]	3.36 ± 0.44[a]	2.89 ± 0.32[b]	0.0[b]	3.09 ± 0.48	15.996	<0.001
Moderate Exercise[3]	789.7 ± 933.1	520.0 ± 540.3	142.7 ± 253.5	484.0 ± 680.3		
Log Moderate Exercise	2.85 ± 0.36[a]	2.71 ± 0.32[a]	2.49 ± 0.34[b]	2.69 ± 0.36	7.528	0.001
Mild Exercise[4]	337.8 ± 395.8	391.8 ± 459.6	177.3 ± 228.6	306.4 ± 387.4		
Log Mild Exercise	2.50 ± 0.40[a,b]	2.56 ± 0.35[a]	2.32 ± 0.32[b]	2.48 ± 0.36	4.429	0.014
Total Exercise[5]	4476.3 ± 2509.4	1564.7 ± 1026.9	320.0 ± 359.0	2079.3 ± 2296.4		
Log Total Exercise	3.59 ± 0.24[a]	3.10 ± 0.32[b]	2.50 ± 0.36[c]	3.08 ± 0.50	140.246	<0.001
How Often Sweat[6]	1.4 ± 0.6[a]	1.9 ± 0.8[b]	3.0 ± 0.0[c]	2.1 ± 0.9	397.5*	<0.001

* Mean ± standard deviation

[Ψ] ANOVA was performed on the normally distributed, log transformed variable

[1] Godin et al., 1986

[2] # of sessions per week*number of minutes per session*factor of 9 (minutes*mets)

[3] # of sessions per week*number of minutes per session*factor of 5 (minutes*mets)

[4] # of sessions per week*number of minutes per session*factor of 3 (minutes*mets)

[5] Sum of strenuous + moderate + mild exercise

[6] How often participants engaged in regular activity long enough to work up a sweat in a week. 1 = often, 2 = sometimes, 3 = never/rarely

* How often sweat was not normally distributed; therefore, the Mann Whitney U test is reported

[a, b, c] Means in the same row with different subscripts are significantly different at $p<0.05$

ii. Exercise Activities

Up to four exercise activities were recorded per individual in both the recreational and competitive exercise groups. All women in these two groups reported at least one activity. A wide variety of activities was reported. Table 3 shows the exercise activities undertaken and the frequency of individuals reporting each exercise activity. The two groups reported non-significantly different frequencies for most activities; however, significance should be considered with caution due to the low sample numbers for many activities. The recreational exercisers reported undertaking significantly more aerobics, dancing, walking, and calisthenics than the competitive group. On the other hand, the competitive group reported significantly more basketball and hockey/skating. Activities in the "other" category included soccer, equestrian riding, and martial arts among others.

Table 3: Frequency of Exercise Activities Reported by Competitive and Recreational Exercise Groups

Activity	Competitive Group Frequency (n = 52)		Recreational Group Frequency (n = 61)		Total Frequency (n = 113)	
	n	Percent	n	Percent	n	Percent
Running/Jogging	27	51.9	29	47.5	56	49.6
Weight Lifting	20	38.5	18	29.5	38	33.6
Cardio Machines	6	11.5	12	19.7	18	15.9
Aerobics*	2	3.8	11	18.0	13	11.5

Activity	Competitive Group Frequency (n = 52)		Recreational Group Frequency (n = 61)		Total Frequency (n = 113)	
	n	Percent	n	Percent	n	Percent
Skiing/ Snowboarding	4	7.7	5	8.2	9	8.0
Swimming	15	28.8	16	26.2	31	27.4
Volleyball	6	11.5	2	3.3	8	7.1
Basketball*	10	19.2	1	1.6	11	9.7
Hockey/Skating*	16	30.8	0	0	16	14.2
Dancing*	1	1.9	9	14.8	10	8.8
Biking	18	34.6	20	32.8	38	33.6
Walking*	9	17.3	27	44.3	36	31.9
Golfing	5	9.6	1	1.6	6	5.3
In-Line Skating	7	13.5	5	8.2	12	10.6
Yoga	3	5.8	10	16.4	13	11.5
Racquet Sports	3	5.8	6	9.8	9	8.0
Workout at Gym	9	17.3	6	9.8	15	13.3
Hiking	5	9.6	1	1.6	6	5.3
Calisthenics*	0	0	5	8.2	5	4.4
Other	8	15.4	9	14.8	17	15.0

* = Frequency is significantly different between exercise groups at $p < 0.05$

iii. Exercise Motivation

Recreational and competitive exercisers were asked to indicate their primary, secondary, and tertiary motivations for exercise. Two individuals did not select a

primary or secondary motivation for exercise and three individuals did not indicate a tertiary motivation for exercise. For those who responded, recreational and competitive exercisers differed significantly in their primary ($\chi^2 = 51.77$, $p < 0.001$) but not secondary ($\chi^2 = 7.46$, $p = 0.280$) or tertiary motivations ($\chi^2 = 8.69$, $p = 0.192$) for exercise. Although the exercise groups had very similar numbers of individuals who reported health, stress relief, socialization, and other motivations for exercise as their primary motivators for exercise, there were larger differences between the exercise groups for competition, weight loss/maintenance, and fitness/muscle toning. Twenty-eight competitive exercisers indicated that competition was their primary motivation for exercise, while no recreational exercisers chose competition as their primary exercise motivator. Twenty-four recreational exercisers versus two competitive exercisers chose weight loss/maintenance as their primary motivation for exercise. Lastly, more than twice as many recreational exercisers ($n = 14$) than competitive exercisers ($n = 6$) indicated that fitness/muscle toning was their primary motivation for exercise. Figures 1, 2, and 3 show the distributions of the primary, secondary, and tertiary exercise motivation factors for the two exercise groups.

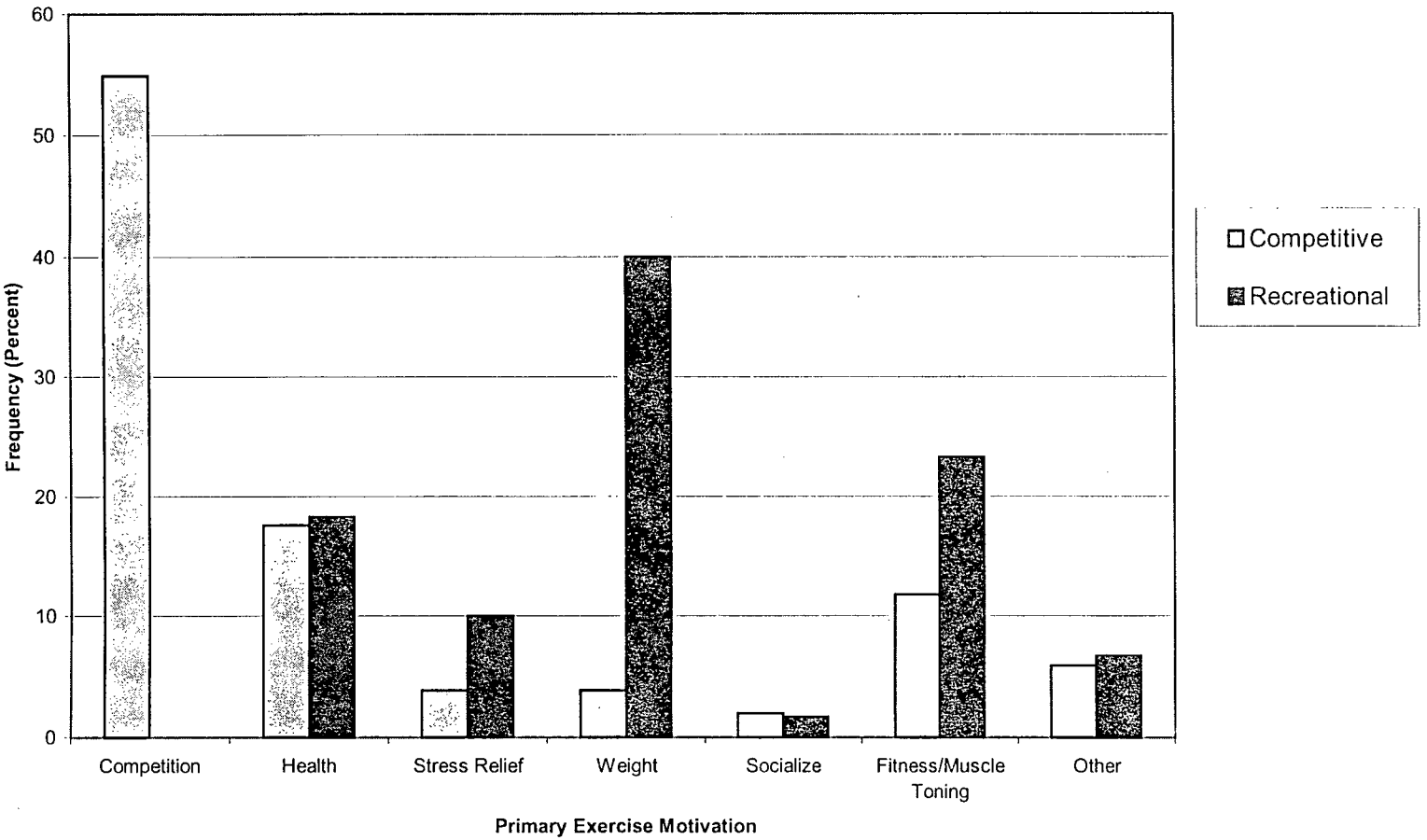

Figure 1: Distribution of Primary Exercise Motivation Among Competitive and Recreational Exercisers

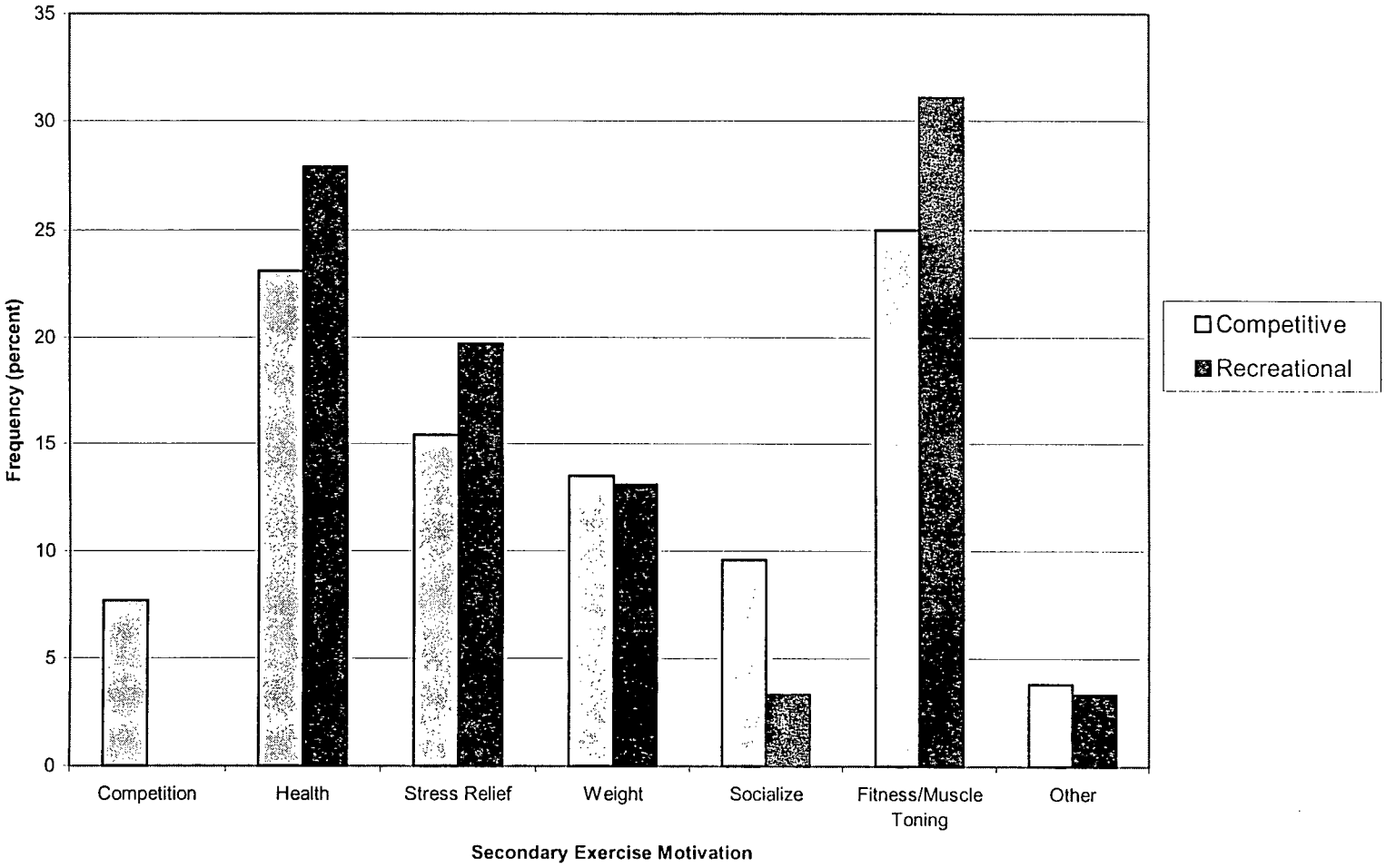

Figure 2: Distribution of Secondary Exercise Motivation Among Competitive and Recreational Exercisers

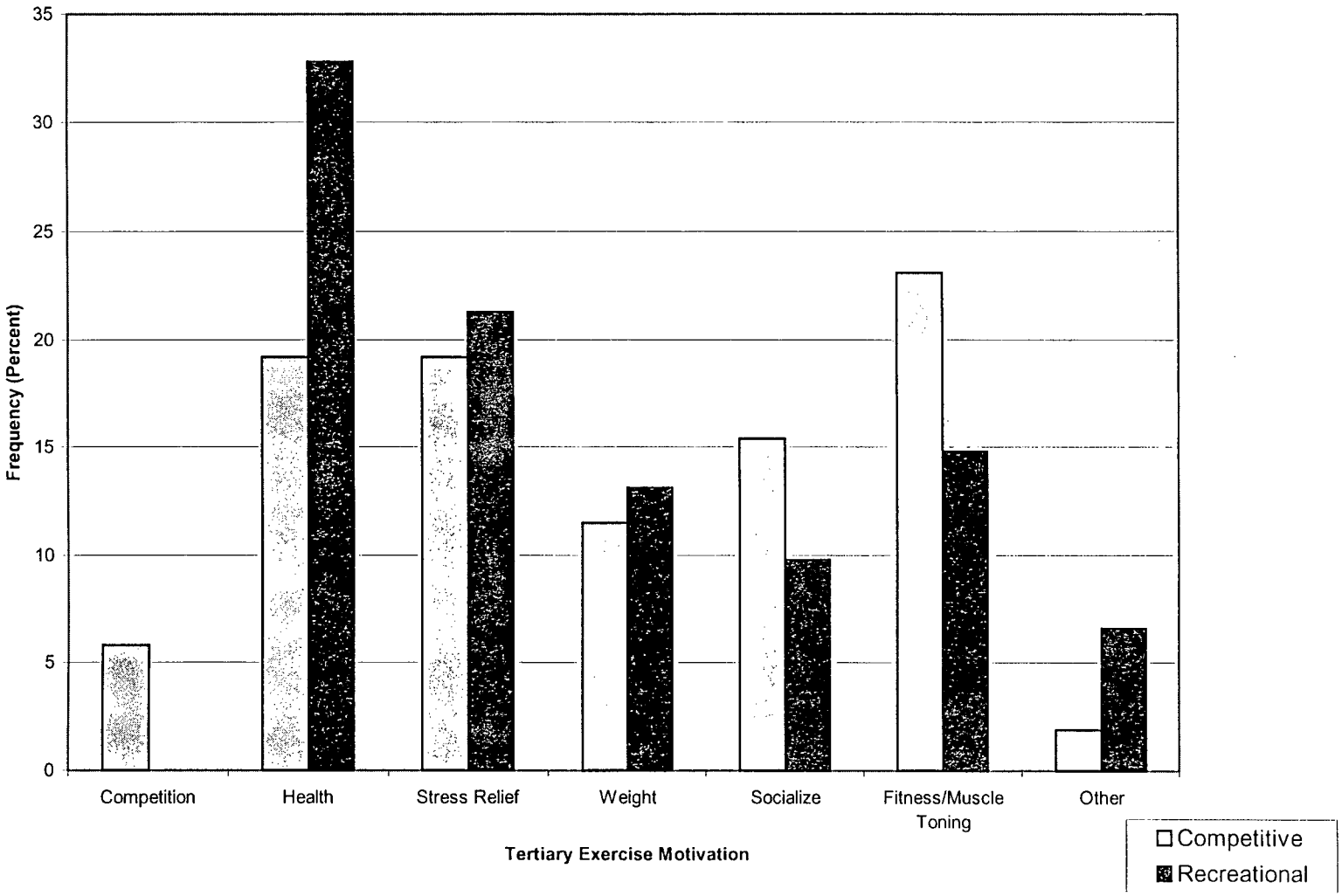

Figure 3: Distribution of Tertiary Exercise Motivation Among Competitive and Recreational Exercisers

3. Body-Size Dissatisfaction

i. Contour Drawing Rating Scale

Table 4 contains group mean scores for current size, ideal size, and scores using both calculation methods for the Contour Drawing Rating Scale. All study participants completed the scale (n = 166). There were no significant differences amongst the groups for current size, nor were group mean ideal scores significantly different. Current sizes ranged from 1 to 8, and ideal sizes ranged from 2 to 6.

The traditional method of calculating the difference between current and ideal size for the Contour Drawing Rating Scale involves taking the absolute value of the difference between the current body size score and ideal body size score for each individual. For this calculation method, the mean for the entire study population was 1.2 ± 0.9 and scores ranged from 0 to 5. The distribution of scores was not normal (Kolmogorov-Smirnov 0.319, $p < 0.001$); therefore, non-parametric tests of difference were executed. The overall median and mode were 1.0.

The new calculation method differs from the traditional calculation method in that the absolute value is not taken; therefore, scores can be negative for individuals who wish to be larger than they are currently. The range of scores in the present investigation was –2 to 5. The overall mean was 1.1 ± 1.1; however, the distribution was not normal (Kolmogorov-Smirnov 0.279, $p < 0.001$) and the median and mode were 1.0. Non-parametric tests determined that the exercise groups' scores were not significantly different.

Table 4: Exercise Group Mean Contour Drawing Rating Scale[1] Scores

Variable	Competitive (n = 52)	Recreational (n = 61)	Non-Exercising (n = 53)	Total Population (n = 166)	Chi-Square	P Value
Current Size	4.9 ± 1.3*	5.0 ± 1.6	4.8 ± 1.4	4.9 ± 1.4	0.210	0.900
Ideal Size	4.0 ± 1.0	3.7 ± 1.1	3.9 ± 0.9	3.8 ± 1.0	2.206	0.332
Traditional Method[2]	1.0 ± 0.9	1.4 ± 1.0	1.3 ± 0.8	1.2 ± 0.9	5.602	0.061
New Method[3]	0.9 ± 1.0	1.3 ± 1.1	0.9 ± 1.2	1.1 ± 1.1	4.136	0.126

* Mean ± standard deviation
[1] Thompson & Gray, 1995
[2] Traditional method for calculating body-size dissatisfaction = absolute value (current body size minus ideal body size)
[3] New method for calculating body-size dissatisfaction = current body size minus ideal body size

ii. Degree of Concern About Differences Between Current and Ideal Body Sizes

This question was developed as an addition to the Contour Drawing Rating Scale to determine how much (or the degree to which) the difference between participants' current and ideal body sizes bothered or concerned them. It was only answered by individuals who reported a difference between their ideal and current scores on the Contour Drawing Rating Scale; therefore, results were calculated from 132 participants. Responses covered the full range of possible scores from "not at all" to "extremely". Overall the mean score was 2.9 ± 1.0 (2 = slightly, 3 = moderately), but the distribution was not normal (Kolmogorov-Smirnov 0.187, $p < 0.001$) and the median and mode were 3.0. Individual group means, medians, and modes are reported in Table 5. The exercise groups were differently bothered or concerned by discrepancies between their current and ideal scores. The competitive exercisers were significantly less concerned by

discrepancies than the other two groups. Recreational and non-exercisers were not significantly different from one another.

Table 5: Exercise Group Mean, Median, and Modes for Degree of Concern About Differences Between Current and Ideal Body Sizes[1]

Variable	Competitive (n = 37)	Recreational (n = 52)	Non-Exercising (n = 43)	Total Population	Chi-Square	P Value
Mean ± SD	2.4 ± 1.0[a]	3.0 ± 1.1[b]	3.0 ± 0.8[b]	2.9 ± 1.0	9.517	0.009
Median	2.0	3.0	3.0	3.0		
Mode	2	3	3	3		

[1] Scores ranged from 1 to 5, where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"

[a, b] Means in the same row with different subscripts are significantly different at $p<0.05$

4. Three Factor Eating Questionnaire (TFEQ)

Table 6 contains the exercise group means for all three factors as well as the total TFEQ scores. For factor 1, dietary restraint, all 52 competitive exercisers completed the questionnaire, but only 58 recreational and 51 non-exercisers completed the questionnaire. All non-exercisers completed factor 2 (disinhibition), but only 59 recreational and 51 competitive exercisers completed it. Again not all recreational (n = 59) or non-exercising (n = 51) women completed factor 3, hunger, but all competitive exercisers did complete this factor.

Table 6: Exercise Group Mean Scores for Eating Behaviour Measured by the Three Factor Eating Questionnaire (TFEQ)[1]

Variable	Competitive (n= 52)	Recreational (n = 61)	Non-Exercising (n = 53)	Total Population	Parametric Tests F	Parametric Tests P Value
Dietary Restraint	6.7 ± 4.7[b*]	10.0 ± 4.8[a]	7.1 ± 5.1[b]	8.0 ± 5.1	7.440	0.001
Total TFEQ Score	17.9 ± 7.1[a]	21.7 ± 8.7[a]	18.3 ± 7.4[a]	19.4 ± 8.0	3.929	0.022
Disinhibition[Ψ]	5.5 ± 3.1	6.8 ± 3.8	6.1 ± 3.2	6.2 ± 3.4		
Log Disinhibition	0.67 ± 0.26[a]	0.76 ± 0.27[a]	0.71 ± 0.27[a]	0.72 ± 0.27	1.383	0.254
					Non-Parametric Test	
					Chi-Square	P Value
Hunger	5.7 ± 2.8[a]	4.8 ± 3.3[a]	5.2 ± 2.9[a]	5.2 ± 3.0	3.957	0.138

* Mean ± standard deviation

[Ψ] ANOVA was performed on the normally distributed, log transformed variable

[a, b] Means in the same row with different subscripts are significantly different at $p<0.05$

[1] Stunkard & Messick, 1985

The distribution for dietary restraint was normal (Kolmogorov-Smirnov 0.077, p = 0.072) so parametric analyses were used. For the total population, the mean was 8.0 ± 5.1, the median was 7.0, and 2 and 5 tied for the mode. Scores ranged from 0 to 19. Non-exercising and competitively exercising women were not significantly different from one another, but recreational exercisers reported significantly higher dietary restraint than these other two groups.

Unlike dietary restraint, the distributions for disinhibition and hunger were not normal (Kolmogorov-Smirnov 0.143, 0.142 respectively, $p < 0.001$). Log

transformations resulted in a normal distribution for disinhibition (Kolmogorov-Smirnov 0.119, $p = 0.169$) but not hunger (Kolmogorov-Smirnov 0.147, $p \leq 0.010$). There were no significant differences in scores amongst the exercise groups for either factor. The mean disinhibition score was 6.2 ± 3.4, the median was 5.0, and 2 and 3 tied for the most frequent scores. The mean hunger score was 5.2 ± 3.0 and the median and mode scores were 5.0. Scores for disinhibition ranged from 1 to 16 and for hunger, 0 to 13.

For the total TFEQ score the differences amongst groups did not reach significance but the trend was for recreational exercisers to have a higher mean score than the other two exercise groups. This distribution was normal so parametric analyses were used (Kolmogorov-Smirnov 0.079, $p = 0.058$). The mean overall TFEQ score was 19.4 ± 8.0 with scores ranging from 4 to 41. The median score was 18.0 and the mode was 13.

5. Social Physique Anxiety Scale (SPAS)

All study participants completed the scale ($n = 166$). Fifty-five participants completed the original version of the SPAS in which the second question asks "I **never** worry about wearing clothes that might make me look too thin or overweight". One hundred forty-two women completed the revised version in which question two was worded "I worry about wearing clothes that might make me look too thin or overweight" and was scored in reverse from the original version. The mean score for the original version was 35.1 ± 10.6, and the mean score for the revised version was 34.4 ± 9.8. Analysis of variance determined that the two versions were not significantly different ($F = 0.198$, $p = 0.657$); therefore, responses on the two versions were pooled

for all analyses. The SPAS distribution was normal (Kolmogorov-Smirnov 0.064, $p \geq 0.200$), so parametric tests were performed in the following analyses. The mean SPAS scores were: competitive exercisers 30.9 ± 9.6, recreational exercisers 34.9 ± 10.4, and non-exercisers 37.0 ± 8.6. The overall mean for the entire population was 34.3 ± 9.8 and scores ranged from 15 to 58, with higher scores representing greater social physique anxiety. There were significant differences amongst the exercise groups ($F = 5.601$, $p = 0.004$). Post hoc tests revealed that competitive exercisers reported significantly less anxiety than the non-exercising women ($p = 0.003$) and that although the difference did not reach significance, the trend was for competitive exercisers to report less anxiety than the recreational exercisers ($p = 0.066$). Recreational exercisers did not score significantly differently than the non-exercisers ($p = 0.468$).

6. High Non-Exercisers

The group of women who indicated that they did not plan exercise yet reported strenuous exercise or that they sometimes engaged in activity "to work up a sweat" (high non-exercisers) did not differ from the non-exercising group on any variable except mild and total exercise. Table 7 summarizes the analysis of difference results for normally distributed variables and Table 8 summarizes those of the variables that were not normally distributed.

Table 7: High Non-Exercise and Non-Exercise Group Mean Scores on Normally Distributed Variables

Variable	High Non-Exercise (n = 23)	Non-Exercise (n = 53)	T-Test	P-Value
Moderate Exercise[1]	355.7 ± 263.2*	142.7 ± 253.5		
Log Moderate Exercise[Ψ]	2.50 ± 0.30	2.49 ± 0.34	-0.145	0.886
Mild Exercise[2]	336.9 ± 420.4	177.3 ± 228.6		
Log Mild Exercise	2.55 ± 0.34	2.32 ± 0.32	-2.232	0.034
Total Exercise[3]	884.2 ± 624.7	320.0 ± 359.0		
Log Total Exercise	2.88 ± 0.29	2.50 ± 0.36	-4.493	< 0.001
TFEQ 1[4]	6.6 ± 5.2	7.1 ± 5.1	0.394	0.696
TFEQ 2[5]	7.0 ± 3.8	6.1 ± 3.2		
Log TFEQ 2	0.76 ± 0.31	0.72 ± 0.27	-0.586	0.561
Total TFEQ[6]	20.1 ± 9.6	18.3 ± 7.4	-0.809	0.424
SPAS[7]	34.74 ± 10.73	37.00 ± 8.62	0.973	0.334
Weight (kg)	58.2 ± 10.5	55.2 ± 9.6	-1.171	0.249

* Mean ± standard deviation

Ψ ANOVA was performed on the normally distributed, log transformed variable

[1] # of sessions per week*number of minutes per session*factor of 5 (minutes*mets) [Godin et al, 1986]

[2] # of sessions per week*number of minutes per session*factor of 3 (minutes*mets) [Godin et al, 1986]

[3] Sum of strenuous + moderate + mild exercise (Godin et al, 1986)

[4] Three Factor Eating Questionnaire Factor 1, dietary restraint (Stunkard & Messick, 1985)

[5] Three Factor Eating Questionnaire Factor 2, disinhibition of dietary restraint (Stunkard & Messick, 1985)

[6] Sum of Three Factor Eating Questionnaire Factors 1, 2, 3 (Stunkard & Messick, 1985)

[7] Social Physique Anxiety Scale (Hart et al., 1989)

Table 8: High Non-Exercise and Non-Exercise Group Mean Scores on Non-Normally Distributed Variables

Variable	High Non-Exercise (n = 23)	Non-Exercise (n = 53)	Mann-Whitney U	P-Value
Age (years)	20.8 ± 2.7*	22.0 ± 4.4	494.0	0.180
Height (m)	1.64 ± 0.1	1.63 ± 0.1	567.5	0.633
BMI (kg/m^2)	21.7 ± 3.9	20.7 ± 2.6	514.5	0.283
Current Size	5.2 ± 1.3	4.8 ± 1.4	502.5	0.336
Ideal Size	3.8 ± 0.8	3.9 ± 0.9	544.0	0.631
New Contour[1]	1.4 ± 1.1	0.9 ± 1.2	451.5	0.112
Traditional Contour[2]	1.5 ± 0.9	1.3 ± 0.8	502.0	0.315
Degree of Concern[3]	2.8 ± 1.2	3.0 ± 0.8	356.0	0.398
TFEQ 3[4]	6.6 ± 4.3	5.2 ± 2.9	504.0	0.332

* Mean ± standard deviation

[1] New method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = current body size minus ideal body size (Thompson & Gray, 1995)

[2] Traditional method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = absolute value (current body size minus ideal body size) [Thompson & Gray, 1995]

[3] Degree of concern about differences between current and ideal body sizes. Scores ranged from 1 to 5, where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = extremely". High non-exercise n = 19, non-exercise n = 53

[4] Three Factor Eating Questionnaire Factor 3, hunger. Non-Exercise (Stunkard & Messick, 1985)

7. Relationships Among Variables

i. Relationships Among BMI, Body-Size Dissatisfaction, the TFEQ, and the SPAS for the Entire Study Population

Spearman's non-parametric correlation coefficients are reported herein for non-normally distributed data, and Pearson's correlation coefficients are reported for normally distributed data. Table 9 contains the correlation coefficients for non-normally distributed and normally distributed variables for the three exercise groups pooled together.

BMI was significantly positively correlated with several variables. Both methods of calculating body-size dissatisfaction using the Contour Drawing Rating Scale were correlated with BMI, but the new method was more strongly correlated than the traditional method. The total TFEQ score was correlated with BMI but the only individual TFEQ factor that was significantly correlated was disinhibition. SPAS score also was significantly positively correlated with BMI.

The new and traditional methods for measuring body-size dissatisfaction using the Contour Drawing Rating Scale scores were strongly positively correlated with each other; therefore, the two were similarly correlated with the other variables. Body-size dissatisfaction, as measured by both the new and traditional methods, was significantly correlated with social physique anxiety. Both methods were less strongly associated with the question regarding the degree of concern with differences between current and ideal body sizes than with social physique anxiety. Further, the question regarding the degree of concern was more strongly correlated with SPAS scores than the new and traditional Contour Drawing Rating Scale calculation methods for body-size

dissatisfaction. Dietary restraint was significantly positively correlated with both methods of calculating body-size dissatisfaction using the Contour Drawing Rating Scale and the degree of concern question, as was disinhibition, and total TFEQ score. However, hunger was not significantly correlated with any measure of body-size dissatisfaction.

Amongst the TFEQ measures, dietary restraint was significantly positively correlated with disinhibition and the total TFEQ score, but it was not significantly correlated with the hunger factor. Disinhibition was positively correlated with dietary restraint, hunger, and total TFEQ score. Total TFEQ score was significantly positively correlated with all three individual factors.

Social physique anxiety scale scores were significantly positively correlated with all three measures of body-size dissatisfaction. They were also significantly positively correlated with BMI, but less strongly so than the body-size dissatisfaction measures. Dietary restraint, disinhibition, and total TFEQ scores were more strongly correlated with SPAS than was hunger.

Table 9: Pearson and Spearman Correlation Coefficients for the Entire Study Population

Variable	BMI (kg/m^2)	New Contour	Traditional Contour	Degree of Concern	TFEQ Factor 1	Log TFEQ Factor 2	TFEQ Factor 3	Total TFEQ	SPAS
BMI (kg/m^2)	1.000[ψ]	0.549**	0.419**	0.094	0.106	0.249**	0.120	0.224*	0.254**
New Contour[1]	0.549**	1.000	0.873**	0.399**	0.443**	0.455**	0.141	0.570**	0.506**
Traditional Contour[2]	0.419**	0.873**	1.000	0.341**	0.336**	0.431**	0.152	0.489**	0.583**
Degree of Concern[3]	0.094	0.399**	0.341**	1.000	0.438**	0.364**	0.055	0.498**	0.678**
TFEQ Factor 1[4]	0.106	0.443**	0.336**	0.438**	*1.000*	*0.222***	-0.136	*0.717***	*0.378***
Log TFEQ Factor 2[5]	0.249**	0.455**	0.431**	0.364**	*0.222***	*1.000*	0.418**	*0.714***	*0.443***
TFEQ Factor 3[6]	0.120	0.141	0.152	0.055	-0.136	0.418**	1.000	0.452**	0.195*
Total TFEQ[7]	0.224*	0.570**	0.489**	0.498**	*0.717***	0.741**	0.452**	*1.000*	*0.548***
SPAS[8]	0.254**	0.506**	0.583**	0.678**	*0.378***	*0.443***	0.195*	*0.548***	*1.000*

* Significant at $p < 0.05$

** Significant at $p < 0.01$

[ψ] Correlation coefficients in italics are Pearson's correlation coefficients. Non-italicized coefficients are Spearman's correlation coefficients

[1] New method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = current body size minus ideal body size (Thompson & Gray, 1995)

[2] Traditional method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = absolute value (current body size minus ideal body size) [Thompson & Gray, 1995]
[3] Degree of concern about differences between current and ideal body sizes. Scores ranged from 1 to 5, where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"
[4] Three Factor Eating Questionnaire Factor 1, dietary restraint (Stunkard & Messick, 1985)
[5] Log transformation of the Three Factor Eating Questionnaire Factor 2, disinhibition of dietary restraint (Stunkard & Messick, 1985)
[6] Three Factor Eating Questionnaire Factor 3, hunger (Stunkard & Messick, 1985)
[7] Sum of Three Factor Eating Questionnaire Factors 1, 2, 3 (Stunkard & Messick, 1985)
[8] Social Physique Anxiety Scale (Hart et al., 1989)

ii. Relationships Among BMI, Body-Size Dissatisfaction, the TFEQ, and the SPAS Within Each Exercise Groups

For the competitive exercisers, several significant positive correlations were found amongst variables, and Table 10 displays all correlations. BMI was positively correlated with SPAS score and both the new and traditional methods for calculating body-size dissatisfaction using the Contour Drawing Rating Scale; however, the question regarding degree of concern with differences between current and ideal sizes was not related to BMI. Within the TFEQ, total TFEQ score was significantly positively correlated with all three individual factors. Dietary restraint and hunger were positively correlated with the log transformation of disinhibition, but not each other. The new and traditional methods for calculating body-size dissatisfaction were closely positively correlated; therefore, they were similarly correlated with other variables. Both were significantly positively correlated with BMI, SPAS score, dietary restraint, the log transformation of disinhibition, total TFEQ score, and the question regarding degree of concern with differences between current and ideal body sizes. This degree of concern question, similar to the other two measures of body-size dissatisfaction, was significantly positively correlated with SPAS score, dietary restraint, the log transformation of disinhibition, and total TFEQ score.

As seen in Table 11, recreational exercisers had a similar pattern of significant positive correlations as competitive exercisers. Non-Exercisers, on the other hand, had a very different pattern of correlations. Table 12 presents these correlations. For non-exercisers, BMI was significantly positively correlated with the log transformation of disinhibition, total TFEQ score, and both the new and traditional methods for calculating

body-size dissatisfaction with the Contour Drawing Rating Scale. Within the TFEQ, the total score was significantly positively correlated with all three individual factors, and the log transformation of disinhibition was significantly positively correlated with hunger. The new and traditional methods of calculating body-size dissatisfaction were positively correlated but did not correlate similarly with other variables. The traditional method was significantly correlated with BMI, SPAS score, hunger, and total TFEQ score. On the other hand, the new method was significantly correlated with BMI, dietary restraint, the log transformation of disinhibition, and total TFEQ score. Interestingly, for non-exercisers neither calculation method was significantly correlated with the question regarding the degree that differences between current and ideal scores concerned individuals.

Table 10: Pearson and Spearman Correlation Coefficients for Competitive Exercisers

Variable	BMI (kg/m^2)	New Contour	Traditional Contour	Degree of Concern	TFEQ Factor 1	Log TFEQ Factor 2	TFEQ Factor 3	Total TFEQ	SPAS
BMI (kg/m^2)	1.000[ψ]	0.440**	0.398**	-0.020	-0.056	0.272	0.249	0.181	0.470**
New Contour[1]	0.440**	1.000	0.928**	0.621**	0.445**	0.551**	0.196	0.643**	0.672**
Traditional Contour[2]	0.398**	0.928**	1.000	0.606**	0.459**	0.527**	0.158	0.642**	0.673**
Degree of Concern[3]	-0.020	0.621**	0.606**	1.000	0.539**	0.474**	0.135	0.676**	0.633**
TFEQ Factor 1[4]	-0.056	0.445**	0.459**	0.539**	*1.000*	*0.326**	-0.211	*0.750***	*0.408***
Log TFEQ Factor 2[5]	0.272	0.551**	0.527**	0.474**	*0.326**	*1.000*	0.332*	*0.760***	*0.424***
TFEQ Factor 3[6]	0.249	0.196	0.158	0.135	-0.211	0.332*	1.000	0.394**	0.166
Total TFEQ[7]	0.181	0.643**	0.642**	0.676**	*0.750***	*0.760***	0.394**	*1.000*	*0.539***
SPAS[8]	0.470**	0.672**	0.673**	0.633**	*0.408***	*0.424***	0.166	*0.539***	*1.000*

* Significant at $p < 0.05$

** Significant at $p < 0.01$

[ψ] Coefficients in italics are Pearson's correlation coefficients, non-italicized coefficients are Spearman's correlation coefficients

[1] New method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = current body size minus ideal body size (Thompson & Gray, 1995)

[2] Traditional method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = absolute value (current body size minus ideal body size) [Thompson & Gray, 1995]

[3]Degree of concern about differences between current and ideal body sizes. Scores ranged from 1 to 5, where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"
[4]Three Factor Eating Questionnaire Factor 1, dietary restraint (Stunkard & Messick, 1985)
[5]Log transformation of Three Factor Eating Questionnaire Factor 2, disinhibition of dietary restraint (Stunkard & Messick, 1985)
[6] Three Factor Eating Questionnaire Factor 3, hunger (Stunkard & Messick, 1985)
[7] Sum of Three Factor Eating Questionnaire Factors 1, 2, 3 (Stunkard & Messick, 1985)
[8] Social Physique Anxiety Scale (Hart et al., 1989)

Table 11: Pearson and Spearman Correlation Coefficients for Recreational Exercisers

Variable	BMI (kg/m^2)	New Contour	Traditional Contour	Degree of Concern	TFEQ Factor 1	Log TFEQ Factor 2	TFEQ Factor 3	Total TFEQ	SPAS
BMI (kg/m^2)	1.000[Ψ]	0.519**	0.439**	0.198	0.092	0.146	0.043	0.150	0.384**
New Contour[1]	0.519**	1.000	0.922**	0.404**	0.426**	0.486**	0.109	0.522**	0.632**
Traditional Contour[2]	0.439**	0.922**	1.000	0.367**	0.363**	0.463**	0.110	0.465**	0.605**
Degree of Concern[3]	0.198	0.404**	0.367**	1.000	0.451**	0.350*	0.193	0.498**	0.779**
TFEQ Factor 1[4]	0.092	0.426**	0.363**	0.451**	*1.000*	*0.171*	-0.047	*0.669***	*0.553***
Log TFEQ Factor 2[5]	0.146	0.486**	0.463**	0.350*	*0.171*	*1.000*	0.589**	*0.735***	*0.485***
TFEQ Factor 3[6]	0.043	0.109	0.110	0.193	-0.047	0.589**	1.000	0.579**	0.199
Total TFEQ[7]	0.150	0.522**	0.465**	0.498**	*0.669***	*0.735***	0.579**	*1.000*	*0.671***
SPAS[8]	0.384**	0.632**	0.605**	0.779**	*0.553***	*0.485***	0.199	*0.671***	*1.000*

* Significant at $p < 0.05$

** Significant at $p < 0.01$

[Ψ] Coefficients in italics are Pearson correlation coefficients, non-italicized coefficients are Spearman's correlation coefficients

[1] New method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = current body size minus ideal body size (Thompson & Gray, 1995)

[2] Traditional method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = absolute value (current body size minus ideal body size) [Thompson & Gray, 1995]

[3] Degree of concern about differences between current and ideal body sizes. Scores ranged from 1 to 5, where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"
[4] Three Factor Eating Questionnaire Factor 1, dietary restraint (Stunkard & Messick, 1985)
[5] Log transformation of Three Factor Eating Questionnaire Factor 2, disinhibition of dietary restraint (Stunkard & Messick, 1985)
[6] Three Factor Eating Questionnaire Factor 3, hunger (Stunkard & Messick, 1985)
[7] Sum of Three Factor Eating Questionnaire Factors 1, 2, 3 (Stunkard & Messick, 1985)
[8] Social Physique Anxiety Scale (Hart et al., 1989)

Table 12: Pearson and Spearman Correlation Coefficients for Non-Exercisers

Variable	BMI (kg/m^2)	New Contour	Traditional Contour	Degree of Concern	TFEQ Factor 1	Log TFEQ Factor 2	TFEQ Factor 3	Total TFEQ	SPAS
BMI (kg/m^2)	1.000[Ψ]	0.683**	0.472**	0.138	0.199	0.346*	0.131	0.347*	-0.075
New Contour[1]	0.683**	1.000	0.789**	0.252	0.363**	0.319*	0.207	0.511**	0.169
Traditional Contour[2]	0.472**	0.789**	1.000	0.000	0.071	0.254	0.315*	0.317*	0.315*
Degree of Concern[3]	0.138	0.252	0.000	1.000	0.305	0.294	-0.103	0.405**	0.450**
TFEQ Factor 1[4]	0.199	0.363**	0.071	0.305	*1.000*	*0.099*	-0.083	*0.705***	*0.138*
Log TFEQ Factor 2[5]	0.346*	0.319*	0.254	0.294	*0.099*	*1.000*	0.360**	*0.633***	*0.389***
TFEQ Factor 3[6]	0.131	0.207	0.315*	-0.103	-0.083	0.360**	1.000	0.469**	0.290*
Total TFEQ[7]	0.347*	0.511**	0.317*	0.405**	*0.705***	*0.633***	0.469**	*1.000*	*0.412***
SPAS[8]	-0.075	0.169	0.315*	0.450**	*0.138*	*0.389***	0.290*	*0.412***	*1.000*

* Significant at $p < 0.05$

** Significant at $p < 0.01$

[Ψ] Coefficients in italics are Pearson's correlation coefficients, non-italicized coefficients are Spearman correlation coefficients

[1] New method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = current body size minus ideal body size (Thompson & Gray, 1995)

[2] Traditional method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = absolute value (current body size minus ideal body size) [Thompson & Gray, 1995]

[3] Degree of concern about differences between current and ideal body sizes. Scores ranged from 1 to 5, where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"
[4] Three Factor Eating Questionnaire Factor 1, dietary restraint (Stunkard & Messick, 1985)
[5] Log transformation of Three Factor Eating Questionnaire Factor 2, disinhibition of dietary restraint (Stunkard & Messick, 1985)
[6] Three Factor Eating Questionnaire Factor 3, hunger (Stunkard & Messick, 1985)
[7] Sum of Three Factor Eating Questionnaire Factors 1, 2, 3 (Stunkard & Messick, 1985)
[8] Social Physique Anxiety Scale (Hart et al., 1989)

iii. Relationships Between Amount of Exercise Activity and BMI, Body-Size Dissatisfaction, the TFEQ, and the SPAS

Several significant correlations were found between exercise activity and other study variables. Table 13 presents correlations involving the log transformation of total exercise activity for all three exercise groups individually and combined. When the three exercise groups were pooled, significant negative correlations existed between the log transformation of total exercise activity and the traditional method for calculating body-size dissatisfaction, the question regarding the degree of concern over differences between current and ideal body sizes, and SPAS score. Amongst recreational exercisers, the log transformation of total exercise activity correlated positively and significantly with the log transformations of strenuous, moderate, and mild exercise, but it did not significantly correlate with any other variables. For competitive exercisers, the log transformation of total exercise was significantly negatively correlated with both methods of calculating body-size dissatisfaction using the Contour Drawing Rating Scale, and social physique anxiety. To be included in the non-exercising group, women could not report any strenuous exercise activity. Amongst the non-exercising women, the log transformation of total exercise activity was significantly positively correlated with the new method of calculating body-size dissatisfaction using the Contour Drawing Rating Scale, and the log transformations of moderate and mild exercise activities.

Table 13: Pearson and Spearman Correlation Coefficients for Total Exercise Activity Measured by the Godin Leisure Time Exercise Questionnaire and BMI, Body-Size Dissatisfaction, TFEQ, and SPAS

	Log Total Exercise			
Variable	Competitive Exercisers (n = 52)	Recreational Exercisers (n = 61)	Non-Exercisers (n = 53)	Total Population (n = 166)
Strenuous Exercise[1]	0.850**	0.618**	X[12]	0.861**
Moderate Exercise[2]	0.110[ψ]	0.558**	0.614**	0.526**
Mild Exercise[3]	-0.129	0.339**	0.578**	0.146
BMI (kg/m^2)	-0.058	-0.214	0.296	-0.046
New Contour[4]	-0.407**	-0.210	0.346*	-0.096
Traditional Contour[5]	-0.406**	-0.191	0.175	-0.219**
Degree of Concern[6]	-0.188	0.057	-0.122	-0.212*
TFEQ 1[7]	*-0.188*	*-0.106*	*0.176*	*-0.080*
Log TFEQ 2[8]	*-0.265*	*-0.210*	*0.153*	*-0.117*
TFEQ 3[9]	0.084	-0.205	0.090	0.035
Total TFEQ[10]	*-0.256*	*-0.208*	*0.114*	*-0.116*
SPAS[11]	*-0.339**	*-0.023*	*-0.142*	*-0.227***

* Significant at $p < 0.05$

** Significant at $p < 0.01$

[ψ] Coefficients in italics are Pearson's correlation coefficients, non-italicized coefficients are Spearman's correlation coefficients

[1] # of sessions per week*number of minutes per session*factor of 9 (minutes*mets) [Godin et al., 1986]
[2] # of sessions per week*number of minutes per session*factor of 5 (minutes*mets) [Godin et al., 1986]
[3] # of sessions per week*number of minutes per session*factor of 3 (minutes*mets) [Godin et al., 1986]
[4] New method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = current body size minus ideal body size (Thompson & Gray, 1995)
[5] Traditional method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = absolute value (current body size minus ideal body size) [Thompson & Gray, 1995]
[6] Degree of concern about differences between current and ideal body sizes. Scores ranged from 1 to 5, where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"
[7] Three Factor Eating Questionnaire Factor 1, dietary restraint (Stunkard & Messick, 1985)
[8] Log transformation of Three Factor Eating Questionnaire Factor 2, disinhibition of dietary restraint (Stunkard & Messick, 1985)
[9] Three Factor Eating Questionnaire Factor 3, hunger (Stunkard & Messick, 1985)
[10] Sum of Three Factor Eating Questionnaire Factors 1, 2, 3 (Stunkard & Messick, 1985)
[11] Social Physique Anxiety Scale (Hart et al., 1989)
[12] Non-Exercisers reported zero strenuous exercise

iv. Relationships Between Exercise Motivation and BMI, Body-Size Dissatisfaction, the TFEQ, and the SPAS

The secondary and tertiary motivational factors were not differently associated with any study variables. However, primary exercise motivation factors were associated with significant differences in several of the variables in this study. Due to the small number of individuals in the socialize and stress relief groups, these have been combined with the 'other' group for analyses. Table 14 presents the primary motivation group means for study variables. Significant differences amongst primary motivation groups existed for SPAS score, dietary restraint, the log transformation of disinhibition, overall TFEQ score, Contour Drawing Rating Scale scores, and the extra question that asked how much the difference between individuals' current and ideal body sizes bothered or concerned them.

Individuals who were primarily motivated for exercise by weight management reported significantly higher SPAS scores than those motivated by all other factors. No other motivation groups reported significantly different SPAS scores from one another.

Differences were seen for scores on the TFEQ. The weight management group scored significantly higher for dietary restraint than all other groups except the fitness/muscle toning group. Individuals motivated by fitness/muscle toning had significantly higher dietary restraint than those motivated by competition. For the log transformation of disinhibition, the weight management group scored significantly higher than the fitness/muscle toning group. There were no significant differences in hunger scores. However, there were significant differences in total TFEQ scores among

motivation groups. The weight management group scored significantly higher than all other groups.

Significant differences between exercise motivation groups were seen for both methods of scoring body-size dissatisfaction using the Contour Drawing Rating Scale. For the traditional method, individuals motivated by weight management scored higher than all groups except the health motivated group. The health motivated group scored significantly higher than the 'other' group. No other groups were significantly different from one another. For the new method, weight management motivated women scored significantly higher than the competition, health, stress relief, fitness/muscle toning, and 'other' factor motivated groups.

The question that was added asking how much the difference between current and ideal body sizes bothered or concerned individuals also produced significant differences amongst exercise motivation groups. Again the weight management motivated group scored significantly higher than the rest of the groups, who did not differ amongst themselves.

Table 14: Mean Scores for Primary Exercise Motivation Groups for BMI, Body-Size Dissatisfaction, the TFEQ[1], and the SPAS[2]

Variable	Competition (n = 28)	Health (n = 20)	Weight (n = 26)	Fitness/ Muscle Toning (n = 20)	Other (n = 17)	Non-Parametric Tests: Chi-Square	Non-Parametric Tests: P Value
BMI (kg/m^2)	21.2 ± 1.1^{a}	21.1 ± 2.2^{a}	22.6 ± 2.8^{a}	20.8 ± 2.2^{a}	21.0 ± 2.4^{a}	7.046	0.133
New Contour[3]	0.8 ± 0.9^{a}*	1.1 ± 1.3^{a}	1.9 ± 1.0^{b}	1.1 ± 0.8^{a}	0.5 ± 0.6^{a}	25.063	< 0.001
Traditional Contour[4]	$0.9 \pm 0.8^{a,b}$	$1.4 \pm 0.9^{b,c}$	1.9 ± 1.0^{c}	$1.1 \pm 0.8^{a,b}$	0.5 ± 0.6^{a}	27.442	< 0.001
Degree of Concern[5]	2.3 ± 1.1^{a}	2.7 ± 1.1^{a}	3.5 ± 1.0^{b}	2.5 ± 0.9^{a}	2.3 ± 0.7^{a}	18.880	0.001
TFEQ 3[6]	5.9 ± 2.9^{a}	5.0 ± 3.0^{a}	5.4 ± 3.2^{a}	3.8 ± 3.0^{a}	5.8 ± 3.5^{a}	6.946	0.139
						Parametric Tests: F	Parametric Tests: P Value
TFEQ 1[7]	5.8 ± 3.7^{c}	$6.8 \pm 4.7^{a,c}$	11.9 ± 4.1^{b}	$10.3 \pm 5.1^{a,b}$	$6.6 \pm 5.4^{a,c}$	8.274	< 0.001
TFEQ 2[8]	4.9 ± 2.2	6.6 ± 2.9	8.3 ± 4.3	4.6 ± 2.5	5.9 ± 3.9		
Log TFEQ 2[9]	$0.6432 \pm 0.2242^{a,b}$	$0.7811 \pm 0.1750^{a,b}$	0.8373 ± 0.3178^{a}	0.6060 ± 0.2256^{b}	$0.6709 \pm 0.3277^{a,b}$	3.241	0.015
Total TFEQ[10]	16.6 ± 5.9^{a}	18.5 ± 7.5^{a}	25.8 ± 8.2^{b}	18.7 ± 6.6^{a}	18.5 ± 9.9^{a}	5.640	< 0.001
SPAS[11]	29.4 ± 9.2^{a}	33.3 ± 8.0^{a}	41.0 ± 9.3^{b}	31.6 ± 11.0^{a}	27.7 ± 8.0^{a}	7.444	< 0.001

* Mean ± standard deviation

[a, b, c] Means in the same row with different subscripts are significantly different at $p < 0.05$

[1] (Stunkard & Messick, 1985)

[2] (Hart, et al., 1989)

[3] New method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = current body size minus ideal body size (Thompson & Gray, 1995)

[4] Traditional method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = absolute value (current body size minus ideal body size) [Thompson & Gray, 1995]

[5] Degree of concern about differences between current and ideal body sizes. Scores ranged from 1 to 5, where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"

[6] Three Factor Eating Questionnaire Factor 3, hunger (Stunkard & Messick, 1985)

[7] Three Factor Eating Questionnaire Factor 1, dietary restraint (Stunkard & Messick, 1985)

[8] Three Factor Eating Questionnaire Factor 2, disinhibition of dietary restraint (Stunkard & Messick, 1985)

[9] ANOVA was performed on the normally distributed, log transformed variable

[10] Sum of Three Factor Eating Questionnaire Factors 1, 2, 3 (Stunkard & Messick, 1985)

[11] Social Physique Anxiety Scale (Hart et al., 1989)

8. Prediction of Variables

i. Prediction of Dietary Restraint

For the prediction of dietary restraint, the following variables were entered into the equation: weight loss/maintenance motivation for exercise, disinhibition, hunger, BMI, SPAS, total exercise activity, the degree of concern with differences between current and ideal body sizes, and the new and traditional methods of calculating body-size dissatisfaction using the Contour Drawing Rating Scale. The backwards method of regression determined that BMI, SPAS score, disinhibition, hunger, and the degree of concern with differences in body sizes best predicted dietary restraint. The more stringent stepwise method reduced the number of variables to three: disinhibition, hunger, and the degree of concern question. The results of the stepwise analysis are in Table 15.

Table 15: Regression Equation* for the Prediction of Dietary Restraint[1] Amongst Competitively, Recreationally, and Non-Exercising Women Pooled Together

Variable	Adjusted R^2	B	Beta	T	P-Value
Constant		5.243		5.972	< 0.001
Degree of Concern[2]	0.356	1.798	0.528	6.045	< 0.001
Hunger[3]	0.402	-0.529	-0.329	-3.826	< 0.001
Disinhibition[4]	0.427	0.338	0.233	2.342	0.021

* Stepwise regression method, ANOVA F = 27.063, p < 0.001
[1] Three Factor Eating Questionnaire, factor 1 (Stunkard & Messick, 1985)
[2] Degree of concern about differences between current and ideal body sizes. Scores ranged from 0 = "not applicable, no difference between current and ideal body sizes", 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"
[3] Three Factor Eating Questionnaire, factor 3 (Stunkard & Messick, 1985)
[4] Three Factor Eating Questionnaire, factor 2 (Stunkard & Messick, 1985)

Amongst the individual exercise groups the variables that predicted dietary restraint differed. Although, similar to the pooled data, the question regarding the degree of concern with differences between current and ideal sizes entered the equations for all three groups. For competitive exercisers, stepwise regression determined that degree of concern with differences between current and ideal body sizes and hunger best predicted dietary restraint (Table 16). Amongst recreationally exercising women, only the degree of concern with body size differences entered the equation (Table 16). The variables that predicted dietary restraint for non-exercising women were both methods of calculating body-size dissatisfaction using the Contour Drawing Rating Scale and the degree of concern with differenced between current and ideal body sizes (Table 16).

Table 16: Regression Equations for the Prediction of Dietary Restraint[1] Amongst Separate Populations of Competitively, Recreationally, and Non-Exercising Women

Variable	Adjusted R^2	B	Beta	t	P-Value
	Competitive Exercisers*				
Constant		6.513		4.907	< 0.001
Degree of Concern[2]	0.202	1.891	0.550	4.421	< 0.001
Hunger[3]	0.291	-0.542	-0.329	-2.650	0.011
	Recreational Exercisers**				
Constant		4.782		4.586	< 0.001
Degree of Concern[2]	0.376	2.050	0.622	5.844	< 0.001
	Non-Exercisers***				
Constant		5.735		4.155	< 0.001
Traditional Contour[4]	0.119	2.336	0.573	3.387	0.001
New Contour[5]	0.186	-3.919	-0.638	-3.449	0.001
Degree of Concern[2]	0.308	1.785	0.468	3.018	0.004

* Stepwise regression method, ANOVA $F = 11.036$, $p < 0.001$
** Stepwise regression method, ANOVA $F = 34.150$, $p < 0.001$
*** Stepwise regression method, ANOVA $F = 8.106$, $p < 0.001$
[1] Three Factor Eating Questionnaire, factor 1 (Stunkard & Messick, 1985)
[2] Degree of concern about differences between current and ideal body sizes. Scores ranged from 0 = "not applicable, no difference between current and ideal body sizes", 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"
[3] Three Factor Eating Questionnaire, factor 3 (Stunkard & Messick, 1985)
[4] Traditional method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = absolute value (current body size minus ideal body size) [Thompson & Gray, 1995]
[5] New method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = current body size minus ideal body size (Thompson & Gray, 1995)

When log transformed variables were used to predict dietary restraint, the prediction equations changed slightly. The log transformed variables that entered into

the analysis were log of total exercise and log of disinhibition For the pooled population, log of total exercise, hunger, and the degree of concern with differences between current and ideal body sizes best predicted dietary restraint (Table 17). Like the non-log transformed equation, amongst competitive exercisers, hunger and the degree of concern with differences in body sizes best predicted dietary restraint (Table 17). Degree of concern was the only variable in the prediction equation amongst recreational exercisers (Table 17). For the non-exercisers, the new method of calculating body-size dissatisfaction using the Contour Drawing Rating Scale and degree of concern with the difference between current and ideal body size entered the prediction equation using stepwise regression (Table 17).

Table 17: Regression Equations for the Prediction of Dietary Restraint[1] Using Log Transformed Variables[2] Amongst Pooled and Separate Populations of Competitively, Recreationally, and Non-Exercising Women

Variable	Adjusted R^2	B	Beta	t	P-Value
	Pooled Population[Ψ]				
Constant		13.151		3.564	0.001
Degree of Concern[3]	0.356	2.006	0.589	7.537	< 0.001
Hunger[4]	0.402	-0.342	-0.212	-2.810	0.006
Log Total Exercise[5]	0.420	-2.173	-0.161	-2.076	0.040
	Competitive Exercisers*				
Constant		6.513		4.907	< 0.001
Degree of Concern[3]	0.202	1.891	0.550	4.421	< 0.001
Hunger[4]	0.291	-0.542	-0.329	-2.650	0.011
	Recreational Exercisers**				
Constant		4.782		4.586	< 0.001
Degree of Concern[3]	0.376	2.050	0.622	5.844	< 0.001
	Non-Exercisers***				
Constant		4.947		3.276	0.002
Degree of Concern[3]	0.123	2.717	0.739	3.579	0.001
Traditional Contour[6]	0.236	-2.801	-0.508	-2.458	0.019

[Ψ] Stepwise regression method, ANOVA $F = 26.395$, $p < 0.001$
* Stepwise regression method, ANOVA $F = 11.036$, $p < 0.001$
** Stepwise regression method, ANOVA $F = 34.150$, $p < 0.001$
*** Stepwise regression method, ANOVA $F = 6.405$, $p = 0.004$
[1] Three Factor Eating Questionnaire, factor 1 (Stunkard & Messick, 1985)
[2] Disinhibition and total exercise were the variables that were log transformed.
[3] Degree of concern about differences between current and ideal body sizes. Scores ranged from 0 = "not applicable, no difference between current and ideal body sizes", 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"
[4] Three Factor Eating Questionnaire, factor 3 (Stunkard & Messick, 1985)
[5] Log of total exercise activity (met*min*duration) [Godin et al., 1986]

[6] Traditional method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = absolute value (current body size minus ideal body size) [Thompson & Gray, 1995]

ii. Prediction of Three Factor Eating Questionnaire (TFEQ) Score

The variables entered into the analysis to predict total TFEQ score were: BMI, weight manipulation motivation for exercise, total exercise activity, SPAS, both methods of calculating body-size dissatisfaction using the Contour Drawing Rating Scale, and the question regarding the degree of concern with differences between current and ideal body sizes. For the three exercise groups pooled together and when separated, the question regarding the degree of concern with differences between current and ideal body sizes entered the prediction equation (Table 18). The pooled population also had SPAS score enter the prediction equation (Table 18). In addition to degree of concern with differences between ideal and current body size, the non-exercising group had the new method of calculating body-size dissatisfaction using the Contour Drawing Rating Scale enter the prediction equation (Table 18). When the log transformation of total exercise was included in the analysis, only the degree of concern with differences between current and ideal body sizes entered the prediction equation for the three exercise groups individually, but SPAS score remained in the prediction equation for the pooled population (Table 19).

Table 18: Regression Equations for the Prediction of Total TFEQ Score[1] Amongst Competitively, Recreationally, and Non-Exercising Women Separately and Pooled Together

Variable	Adjusted R^2	B	Beta	t	P-Value
	Pooled Population$^{\Psi}$				
Constant		6.517		2.929	0.004
Degree of Concern[2]	0.420	2.143	0.392	3.352	0.001
SPAS[3]	0.456	0.263	0.331	2.829	0.006
	Competitive Exercisers*				
Constant		12.273		10.309	< 0.001
Degree of Concern[2]	0.393	3.185	0.637	5.725	< 0.001
	Recreational Exercisers**				
Constant		12.215		6.435	< 0.001
Degree of Concern[2]	0.370	3.682	0.617	5.768	< 0.001
	Non-Exercisers***				
Constant		12.647		7.030	< 0.001
New Contour[4]	0.275	2.242	0.388	2.799	0.007
Degree of Concern[2]	0.325	1.587	0.293	2.115	0.040

$^{\Psi}$ Stepwise regression method, ANOVA $F = 45.060$, $p < 0.001$
* Stepwise regression method, ANOVA $F = 32.775$, $p < 0.001$
** Stepwise regression method, ANOVA $F = 33.270$, $p < 0.001$
*** Stepwise regression method, ANOVA $F = 12.555$, $p < 0.001$
[1] Three Factor Eating Questionnaire (Stunkard & Messick, 1985)
[2] Degree of concern about differences between current and ideal body sizes. Scores ranged from 1 to 5, where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"
[3] Social Physique Anxiety Scale (Hart et al., 1989)
[4] New method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = current body size minus ideal body size (Thompson & Gray, 1995)

Table 19: Regression Equations for the Prediction of Total TFEQ Score[1] Using Log Transformed Variables[2] Amongst Pooled and Separate Populations of Competitively, Recreationally, and Non-Exercising Women

Variable	Adjusted R^2	B	Beta	t	P-Value
	Pooled Population$^{\Psi}$				
Constant		6.517		2.929	0.004
Degree of Concern[3]	0.420	2.143	0.392	3.352	0.001
SPAS[4]	0.456	0.263	0.331	2.829	0.006
	Competitive Exercisers*				
Constant		12.273		10.309	< 0.001
Degree of Concern[3]	0.393	3.185	0.637	5.725	< 0.001
	Recreational Exercisers**				
Constant		12.215		6.435	< 0.001
Degree of Concern[3]	0.370	3.682	0.617	5.768	< 0.001
	Non-Exercisers***				
Constant		11.397		5.250	< 0.001
Degree of Concern[3]	0.316	3.314	0.579	4.142	< 0.001

$^{\Psi}$ Stepwise regression method, ANOVA $F = 45.060$, $p < 0.001$
* Stepwise regression method, ANOVA $F = 32.775$, $p < 0.001$
** Stepwise regression method, ANOVA $F = 33.270$, $p < 0.001$
*** Stepwise regression method, ANOVA $F = 17.152$, $p < 0.001$
[1] Three Factor Eating Questionnaire (Stunkard & Messick, 1985)
[2] Total Exercise was the log transformed variable
[3] Degree of concern about differences between current and ideal body sizes. Scores ranged from 1 to 5, where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "very", 5 = "extremely"
[4] Social Physique Anxiety Scale (Hart et al., 1989)

iii. Prediction of Total Exercise Activity

Both the original distribution and the log transformation of total exercise were predicted by regression. Variables included in the analysis were BMI, SPAS, all three factors and the total score of the TFEQ, the question regarding the concern with the difference between current and ideal size, and both methods of measuring body-size dissatisfaction using the Contour Drawing Rating Scale. Table 20 contains the regression equation information amongst the pooled and individual exercise groups for the prediction of the original distribution of total exercise activity. For the pooled population, only weight motivation for exercise entered the prediction equation. Total exercise could not be predicted by the chosen variables for the competitive exercisers. BMI best predicted total exercise activity amongst the recreationally exercising group. Both BMI and SPAS score were included in the equation predicting total exercise activity for the non-exercising women.

When the log transformation of total exercise activity was predicted, dietary restraint joined weight motivation for exercise in the regression equation amongst the pooled population (Table 21). A weak regression equation was developed for the competitive exercisers using the traditional method of calculating body-size dissatisfaction (Table 21). However, the log of total exercise activity could not be predicted for recreational and non-exercising women using the chosen variables.

Table 20: Regression Equations for the Prediction of Total Exercise Activity[1] Amongst Pooled and Separate Populations of Recreationally and Non-Exercising Women

Variable	Adjusted R^2	B	Beta	t	P-Value
	Pooled Population$^{\Psi}$				
Constant		3454.568		13.730	< 0.001
Weight Motivation[2]	0.102	-1859.068	-0.332	-3.588	0.001
	Recreational Exercisers*				
Constant		3902.525		3.409	0.001
Body Mass Index (kg/m^2)	0.053	-107.769	-0.265	-2.023	0.048
	Non-Exercisers**				
Constant		-145.795		-0.369	0.714
Body Mass Index (kg/m^2)	0.101	47.449	0.358	2.795	0.008
SPAS[3]	0.214	-14.302	-0.357	-2.785	0.008

$^{\Psi}$ Stepwise regression method, ANOVA F = 12.876, p = 0.001
* Stepwise regression method, ANOVA F = 4.091, p = 0.048
** Stepwise regression method, ANOVA F = 7.546, p = 0.001
[1] Godin et al., 1986
[2] "Lose or maintain weight" was ranked as primary motivator for exercise where yes = 1 and no = 0
[3] Social Physique Anxiety Scale (Hart, et al., 1989)

Table 21: Regression Equations for the Prediction of the Log Transformation of Total Exercise Activity[1] Using Log Transformed Variables[2] Amongst the Pooled Population and Competitively Exercising Women

Variable	Adjusted R^2	B	Beta	t	P-Value
	Pooled Population$^{\Psi}$				
Constant		3.534		54.280	< 0.001
Weight Motivation[3]	0.134	-0.256	-0.290	-2.965	0.004
Dietary Restraint[4]	0.164	$-1.575*10^{-2}$	-0.213	-2.172	0.032
	Competitive Exercisers*				
Constant		3.695		79.322	< 0.001
Traditional Contour[5]	0.107	$-9.524*10^{-2}$	-0.353	-2.618	0.012

$^{\Psi}$ Stepwise regression method, ANOVA $F = 11.309$, $p < 0.001$

* Stepwise regression method, ANOVA $F = 6.854$, $p = 0.012$

[1] Godin et al., 1986

[2] Disinhibition was log transformed

[3] "Lose or maintain weight" was ranked as primary motivator for exercise where yes = 1 and no = 0

[4] Three Factor Eating Questionnaire, factor 1 (Stunkard & Messick, 1985)

[5] Traditional method for calculating body-size dissatisfaction measured by the Contour Drawing Rating Scale = absolute value (current body size minus ideal body size) [Thompson & Gray, 1995]

9. Summary of Results with Reference to Study Hypotheses

Following is a list of the study hypotheses with corresponding results.

1) **There will be no difference in cognitive dietary restraint, disinhibition of eating or susceptibility to hunger as measured by the Three Factor Eating Questionnaire (TFEQ) among non-exercising, recreationally exercising, and competitively exercising women.**

This hypothesis could not be rejected for disinhibition or hunger. However, the hypothesis was partially rejected as the recreationally exercising group reported significantly greater dietary restraint than the other two groups.

2) **There will be no difference in social physique anxiety as measured by the Social Physique Anxiety Scale (SPAS) among non-exercising, recreationally exercising, and competitively exercising women.**

There were significant differences amongst the exercise groups in that competitive exercisers reported significantly less anxiety than the non-exercisers. Competitive exercisers were not significantly different than recreational exercisers, and recreational exercisers were not significantly different than non-exercisers. Therefore, the hypothesis was only partially rejected.

3) There will be no difference in body-size dissatisfaction as measured by the Contour Drawing Rating Scale among non-exercising, recreationally exercising, and competitively exercising women.

This hypothesis was not rejected as all differences amongst the exercise groups were not statistically significant. However, an additional question assessing the degree of concern with the difference between current and ideal body sizes did differ among the exercise groups. Competitively exercising women were significantly less concerned with differences between ideal and current body sizes.

4) There will be no correlation between social physique anxiety as measured by the SPAS and cognitive dietary restraint, disinhibition of eating, or susceptibility to hunger as measured by the TFEQ.

This hypothesis was rejected. SPAS scores were significantly correlated with all three individual factors, as well as, total TFEQ score.

5) There will be no correlation between social physique anxiety as measured by the SPAS and body-size dissatisfaction as measured by the Contour Drawing Rating Scale.

There were significant correlations between SPAS and both the new and traditional methods of measuring body-size dissatisfaction using the Contour Drawing Rating Scale; therefore, this hypothesis was rejected.

6) **There will be no correlation between body-size dissatisfaction as measured by the Contour Drawing Rating Scale and cognitive dietary restraint, disinhibition of eating, or susceptibility to hunger as measured by the TFEQ.**

This hypothesis could not be rejected for the hunger factor. But it was rejected for dietary restraint and disinhibition, as correlations were statistically significant with both methods of measuring body-size dissatisfaction using the Contour Drawing Rating Scale. Further, the total TFEQ score was significantly correlated with both measurement methods.

CHAPTER V

DISCUSSION

1. Introduction

This study was undertaken to examine whether exercise habits were related to women's food attitudes and feelings about their bodies. The study's null hypotheses stated that there would be no difference among non-exercising, recreationally exercising, and competitively exercising women with respect to body-size dissatisfaction, Three Factor Eating Questionnaire (TFEQ) scores, or Social Physique Anxiety Scale (SPAS) scores. It was also hypothesized that body-size dissatisfaction, TFEQ, and SPAS would not be correlated.

First the findings for height, weight, and BMI will be discussed. Second will be a discussion regarding the findings for exercise including results on the Godin Leisure Time Exercise Questionnaire, exercise activities reported by participants, and exercise motivation. Next will be discussions regarding the TFEQ, body-size dissatisfaction, and the SPAS. A discussion regarding the relationships among exercise habits, food attitudes, and women's feelings about their bodies will follow. Regression analysis results will then be discussed. Study limitations, conclusions, and directions for future research will complete this chapter.

2. Body Mass Index (BMI), Height, and Weight

All group mean BMIs were within the healthy range of 20 - 25 defined by Health Canada (1988, as cited in Gibson, 1990); however, some individuals' BMIs were outside of the healthy range. Twenty-one percent of respondents (n = 35) reported BMIs below the healthy range. Nine individuals (5.4%) reported BMIs between 25 and 27 which is

the overweight range considered to be possibly associated with health risks for some people, and two individuals reported BMIs between 27 and 30 which is the overweight range considered to be associated with increased health risks for heart disease, high blood pressure, and diabetes (Health Canada, 1988, as cited in Gibson, 1990).

Although BMI was similar, height and weight were significantly different amongst the exercise groups. The competitive exercisers were significantly taller than the recreational group and taller and heavier than the non-exercising group. Sampling could have accounted for some of the competitive athletes being tall, as the UBC varsity basketball and volleyball teams were recruited for the study and height is an asset on these teams. For example, several of the women from the basketball team were six feet (1.83m) in height or taller.

One limitation with the heights, weights, and BMIs for this study is that they were self-reported. However, although there is a small amount of under-reporting of weight and over-reporting of height, studies have found that for a non-overweight, young adult population the corresponding error in BMI is negligible (Rowland, 1990). Another limitation with BMI is that it does not measure what proportion of an individual's weight is lean mass or fat mass. Thus, it may be that although the three exercise groups did not differ with respect to BMI, the individuals in the exercising groups could have a larger proportion of their weight as lean mass, which is perceived as more attractive in the North American socio-cultural context (Glassner, 1990). However, the groups did not differ in their reports of their current size on the Contour Drawing Rating Scale, which does not support the hypothesis that the groups had different body sizes due to differing proportions of lean and fat mass.

3. Exercise Habits

Three groups of women with different exercise habits were successfully recruited. The competitive, recreational, and non-exercising groups reported significantly different amounts of exercise activity from one another while maintaining a large variety of activities undertaken within each group. Further, the competitively exercising women reported competition as their primary motivation for exercise (n = 28, 54%) more often than the recreationally exercising women (n = 0, 0%).

In addition to the large variance in amount of exercise, recreational and competitive exercisers reported a wide variety of different activities. Running/jogging (49.6% of individuals), biking (33.6%), and lifting weights (33.6%) were the most popular activities amongst both recreational and competitive exercisers. Walking was also very popular amongst recreational exercisers (44.3% of recreational exercisers). The competitive exercisers competed in a variety of activities, including those not often represented in research, such as ice hockey and golf. One potential source of bias was that a considerable proportion of the competitive exercisers (n = 16, 30.7%) belonged to the UBC varsity ice hockey team.

Although this study was successful in recruiting three groups of women with the intended exercise habits, there was a problem with the question that asked "Do you plan exercise into your day?". Twenty-three women responded "no" to this question, yet they reported at least one bout of strenuous exercise per week and/or sometimes or often engaging in regular activity long enough to work up a sweat. This exercise planning question was developed to differentiate individuals who exercised from those who did

not exercise. It was based on the definition that characterized exercise as physical activity that is structured and repeated (Shelton & Klesges, 1995). The women's 'no' response to the question regarding planning exercise should have categorized them into the non-exercising group. Yet, their reports of abundant exercise activity precluded their classification as 'non-exercising' as they obviously engaged in considerable, unplanned exercise. Although this high non-exercising group was not significantly different from the non-exercising women on any study variable aside from exercise activity, they represent a fourth group of individuals with respect to exercise habits and were not included in study analyses.

4. Exercise Motivation

A simple question asking "Why do you exercise?" was used to measure exercise motivation. As this was not a main focus of this investigation, and in the interest of keeping the questionnaire brief, a validated questionnaire was not used. With such a crude method comes the possibility of error in measurement. However, support for the single question comes from the result that competition was the most common motivation for competitively exercising women and not a motivator for the recreationally exercising women.

Women were asked to rank their top three motivators for exercise. Only the primary exercise motivation was significantly different between the competitive and recreationally exercising groups. It was those motivators related to the socio-cultural context of North American beauty that differed between the exercise groups. Recreational exercisers reported being motivated for exercise primarily by weight

loss/maintenance and fitness/muscle toning significantly more than competitive exercisers. This difference was quite dramatic. Only two (3.8%) competitive exercisers versus 24 (39.3%) recreational exercisers ranked weight loss/maintenance as their primary motivator. And for fitness/muscle toning, six (11.5%) competitive exercisers versus 14 (23.0%) recreational exercisers ranked it as their primary motivator for exercise. This finding amongst recreationally exercising women supports other research that has found that women are motivated for exercise by weight management and muscle toning, but results for the competitively exercising women contradict others' findings. However, the present study is the first to separate exercisers into competitive and recreational groups for analysis. Scharff and colleagues (1999) found that the most frequent motivator for women younger than 30 years old was weight loss. The women who participated in Scharff and colleagues' study were 653 women, aged 18-75 years, who completed questionnaires while in the waiting room of community-based family clinics. Harrison, Brennan, and Levine (2000) found in their sample of military personnel, that 63% of women were motivated for exercise by weight management and 57% by appearance. Finkenberg and colleagues (1994) used a more similar sample to the present investigation, 113 female college students, classified as either physically active or not physically active. Appearance, weight management, and social recognition were the most common motivators for exercise. Frederick and Ryan (1993) classified their participants based on gender and reported activities. They found that individuals participating in sports were motivated by interest/enjoyment and competition, and individuals participating in exercise activities that improve fitness (e.g. running) were motivated by body-related motives (Frederick & Ryan, 1993). Frederick and Ryan

(1993) and Chen (1998) both found that body-related motivation was stronger amongst North American women than men.

The results also provide partial support for theories that hypothesize that in the socio-cultural context of North America that defines female beauty as thin and fit, women undertake exercise in an attempt to meet this body ideal; sixty-three percent of recreationally exercising women identified that manipulating their bodies (weight management or fitness/muscle toning) was the primary motivation for their undertaking exercise. But, only eight competitively exercising women reported such motivators for exercise.

Further, results from this study provide some support for the hypothesis that women who are motivated for exercise by the pressure to achieve the culturally ideal thin, fit body may have poorer eating attitudes and feelings about their bodies. A general pattern arose in this study for women primarily motivated for exercise by weight loss/maintenance to score poorer on the TFEQ, body-size dissatisfaction measures, and SPAS than the other motivation groups. Specifically, the weight motivated group reported significantly higher social physique anxiety, dietary restraint, total TFEQ score, and body-size dissatisfaction measured by both the new and traditional methods of the Contour Drawing Rating Scale and the extra question added enquiring about the degree of concern individuals had regarding the difference between their current and ideal body sizes, than women primarily motivated for exercise by competition. Women primarily motivated for exercise by weight management scored higher than women motivated by 'other' reasons for social physique anxiety, dietary restraint, total TFEQ score, both the new and traditional methods of calculating body-size dissatisfaction using the Contour

Drawing Rating Scale, and the question regarding concern with the difference between current and ideal body sizes. Weight motivated women scored significantly higher than health motivated women for SPA, dietary restraint, total TFEQ, the new method of calculating body-size dissatisfaction using the Contour Drawing Rating Scale, and the question regarding the degree of concern/bother with differences between current and ideal body sizes. Interestingly, women primarily motivated by weight management reported higher social physique anxiety, disinhibition of restraint, total TFEQ scores, and all three methods of measuring body-size dissatisfaction than women primarily motivated by fitness/muscle toning. But, this did not mean that fitness/muscle toning motivated women scored as well on all measures as women motivated by the other factors. In fact fitness/muscle toning motivated women scored significantly higher in dietary restraint than the competitively motivated women, and did not differ in dietary restraint scores from women motivated by weight management.

5. Women's Food Attitudes and Feelings About Their Bodies

i. The Three Factor Eating Questionnaire (TFEQ)

Mean scores for dietary restraint, disinhibition, and hunger were lower than most studies, higher than the mean scores in a few investigations, but similar to the results of another study involving UBC students. The mean scores for the present investigation were 8.0 ± 5.1 for dietary restraint, 6.2 ± 3.4 for disinhibition, and 5.2 ± 3.0 for hunger. These are lower than the mean scores found by Westenhoefer (1991) in a large sample of German women (n = 46 132). The mean scores reported by Westenhoefer (1991) were 13.07 ± 4.55 for dietary restraint, 8.47 ± 3.61 for disinhibition, and 6.28 ± 3.51 for

hunger. The present study scores are also lower than those found by Stunkard and Messick (1985). These two researchers found mean scores of 10.5 ± 6.2 (dietary restraint), 10.0 ± 5.9 (disinhibition), and 7.1 ± 4.1 (hunger) amongst 98 dieting and free eating adults (Stunkard & Messick, 1985). The mean scores in the present investigation were similar to those found by a study conducted at UBC. McLean (1999) found mean scores amongst approximately 600 female UBC students to be 8.6 ± 5.3 for dietary restraint, 6.2 ± 3.7 for disinhibition, and 6.4 ± 3.1 for hunger. Mean dietary restraint was slightly higher for 139 nonobese Swedish women than for the present study [9.0 ± 0.4 (SEM) versus 8.0 ± 5.1], but disinhibition and hunger scores were lower amongst the Swedish population than the present population [disinhibition 4.5 ± 0.3 (SEM) versus 6.2 ± 3.4; hunger 3.5 ± 0.3 (SEM) versus 5.2 ± 3.0] {Lindroos, Lissner, Mathiassen, Karlsson, Sullivan, Bengtsson, & Sjostrom, 1997}. The opposite pattern was seen with a study involving a slightly older population (mean age 35.4 ± 6.2, n = 101)[Gendall et al., 1998]. In Gendall and colleagues' study (1998) the mean dietary restraint score was 6.5 ± 4.7, disinhibition score was 5.8 ± 3.9, and hunger score was 4.8 ± 2.9.

The grouping guidelines for dietary restraint are 1-10 low to average, 11-13 high, and ≥ 14 clinical range (Gorman & Allison, 1995). Compared to the grouping guidelines, the competitively exercising and non-exercising women reported low to average dietary restraint in the present investigation. However, the recreational group mean score falls on the upper end of low to average. A number of individuals scored in the high and clinical ranges. Nine individuals scored in the high restraint range. A further seven participants scored in the clinical range. Disinhibition and hunger do not have grouping guidelines.

The only factor of the TFEQ that was significantly different amongst the exercise groups was dietary restraint. Recreational exercisers reported significantly more dietary restraint than the competitive and non-exercising groups. The competitive and non-exercising groups were not significantly different from one another Therefore, the hypothesis that women adopt, in conjunction, restrained eating and exercise in order to obtain the socio-culturally ideal body is only supported amongst recreationally exercising women. However, the recreationally exercising women's mean restraint score was only on the borderline between low/average and high. The competitively exercising women, who reported the most exercise activity, reported low dietary restraint and did not report higher dietary restraint than the non-exercising women.

ii. The Contour Drawing Rating Scale

Scores on the Contour Drawing Rating Scale were very similar amongst the exercise groups. The mean, median, and mode for current size were all approximately equal to 5, the middle figure on the scale. Although scores ranged from 1 to 8, 85% of participants chose figures 3, 4, 5, or 6 as best representing how they currently looked. This was consistent across the exercise groups as there were no significant differences in current size. Ideal size was also consistent across the exercise groups, with no significant differences. On average, women reported ideally being figure 4 (mean = 3.83 $\pm$ 1.43, median = 4.0, mode = 4). The range of scores for ideal size was narrower than for current size, as women ideally wanted to have a body sized between figures 2 and 6.

Body-size dissatisfaction was calculated using two methods in the present study. Traditionally the absolute value of the difference between current and ideal size is taken

to only record the magnitude of difference, not direction. However, we questioned whether women who desired to be larger than their present size would score the same as women who desired to be smaller on other study variables. Therefore, we developed a new method of calculating body-size dissatisfaction that did not take the absolute value of the discrepancy between current and ideal figures. Thus, scores indicated the magnitude and direction of differences between the two figures. The two methods, however, were highly correlated amongst the entire study population and within individual exercise groups. This is because the number of individuals who ideally wanted to be larger than they were currently was quite small (n = 13). The majority of the individuals who chose ideal figures larger than their current figures were non-exercisers (n = 9). This caused the new and traditional methods to be less strongly correlated amongst the non-exercising women. A further discussion of correlations between body-size dissatisfaction as measured by the Contour Drawing Rating Scale and other study variables will follow (section 6).

The ideal size that an individual chose was related to her current size, with larger women choosing larger figures, and thinner women choosing thinner figures. This can be seen by the fact that 94.0% of respondents chose to be 0, 1, or 2 figures different than their current size. Only 20% of participants did not wish to be a different size than their current size. That the majority of women wanted to be a different size, and that the majority wanted to be thinner, supports the hypothesis that women in North America desire a thin, fit ideal body. Some support for theories that state that there is one ideal body for all women (e.g. Bordo, 1993) comes from the findings that the exercise groups did not differ with respect to this desire for an ideal body size, and that the range of ideal

body sizes was narrower than the range of current body sizes. Hallinan and colleagues (1991) found similar results in their study involving 56 non-athletes and 65 varsity athletes attending an American college. The two groups chose very similar ideal body sizes.

iii. Degree of Concern About Differences Between Current and Ideal Body Sizes

Results for this question contrasted with those using the Contour Drawing Rating Scale. Measuring body-size dissatisfaction using the Contour Drawing Rating Scale, participants idealized a narrower range than the range of perceived body-sizes, and ideal size did not differ amongst the exercise groups. In contrast, competitive exercisers reported significantly less concern regarding differences between their current and ideal body sizes than the other two exercise groups. Non-exercisers and recreational exercisers were not significantly different from one another in degree of concern.

These combined findings of the Contour Drawing Rating Scale and degree of concern question suggest that in North America women idealize a similar thin, fit body regardless of exercise habits. However, how much this difference between current and ideal body sizes bothers or concerns women is variable. Competitive exercisers ideally wanted to be the same amount different from their current size as the other women, yet they were less concerned by this discrepancy. This raises doubts regarding whether the Contour Drawing Rating Scale measures body-size dissatisfaction *per se* or whether it simply measures the magnitude of difference between an individual's perceived current and ideal body sizes. How dissatisfied an individual is with her body size may not

directly increase with her perceived gap between her current and ideal body sizes. Further support for this concept comes from the lack of association found between the degree of concern question and BMI; in other words, there was no concomitant increase in concern with an increase in weight for height (i.e. further from the thin ideal).

Koff and Bauman (1997) found somewhat similar results as the present study. Their study included a variety of measures of body dissatisfaction including the Figure Rating Scale that is similar to the Contour Drawing Rating Scale, and the Body Areas Satisfaction Scale that directly asks individuals how satisfied they are with particular body parts. The study included 140 female college students who were enrolled in wellness, fitness, or sport skill classes. Those who participated in the wellness and fitness classes improved their scores for body satisfaction but did not change their scores on the Figure Rating Scale. In both Koff and Bauman's (1997) study and the present study, the responses on the scales that measure the difference between current and ideal figures differ from the responses on the measure that directly asks about body dissatisfaction.

Amongst studies that only used questionnaires that asked directly about body dissatisfaction, there were a variety of results. Unfortunately none of these studies separated competitive exercisers from recreational exercisers, although some did include non-exercising groups. Davis and Cowles (1991) used a scale that listed eleven body parts and asked participants to rank how they felt about each body part on a Likert scale from "strongly like" to "strongly dislike" (Davis & Cowles, 1991). Although that study only included exercising women (n = 112), dissatisfaction was not related to amount of physical activity, leading the authors to conclude "It may be that regular exercise does

little to alter body weight ideals for...women, or the degree to which they perceive themselves discrepant from their ideals" (Davis & Cowles, 1991, p.41). A second study by Davis (1990) using the body dissatisfaction subscale of the Eating Disorder Inventory also found no difference between 99 non-exercising women and 112 women who belonged to fitness and track clubs in Toronto. However, in this study the exercising women reported that their feelings about their bodies were more important to the way they felt about themselves, or in other words their self-esteem. The third study involving Davis found that 44 women who reported high amounts of exercise (six days per week of moderate to intense activity for 1 hour or more) reported more body dissatisfaction than 46 non-exercising women (Davis & Fox, 1993). That third study used the Body Cathexis scale that uses a Likert scale to rank how much individuals like a list of body parts.

The findings in the present study may help to explain the mixed results amongst the studies by Davis and her colleagues. Those studies did not control for competitive versus recreational exercise within the exercise groups. The present study found that competitive exercisers were significantly less concerned with differences between their current and ideal body sizes than non-exercisers and recreational exercisers. Therefore, not controlling for this difference in exercise participation may have caused her to find differences between non-exercising and exercising women in some studies but not in others.

iv. Social Physique Anxiety

With possible scores ranging from 12 to 60, the range of scores in the present investigation, 15 to 58, represents a wide variety of social physique anxiety experienced by participants. The present study's mean score of 34.3 ± 9.8 was somewhat lower than that in many other investigations involving young adult women. The scale developers found mean scores of 37.9 ± 9.78 and 37.0 ± 10.01 amongst 97 and 114 female university students (Hart et al, 1989). In the investigation by Lantz and colleagues (1997) the mean score for the 180 women aged 18 to 60 years was 36.1 ± 8.1. Frederick and Morrison (1996) reported a mean score of 35.3 amongst 326 men and women who belonged to a university fitness center. Crawford and Eklund (1994) found a higher mean social physique anxiety score of 40.12 ± 9.75 amongst the 104 college attending women who participated in their study. However, in a second study by these authors that included 94 women enrolled in undergraduate physical education and physical activity classes, the mean social physique anxiety score was 37.31 ± 9.81 which is closer to the mean score in the present investigation (Eklund & Crawford, 1994). Spink (1992) found a mean score of 37.8 ± 7.8 amongst 64 female nursing students, Frederick and Morrison (1998) found a mean score of 38.3 amongst 79 women attending college, and Cox and colleagues (1997) reported a mean score of 37.85 ± 8.64 amongst 131 female undergraduate students.

In the present investigation, competitive exercisers reported significantly less anxiety than non-exercisers. Recreational exercisers reported an intermediate amount of social physique anxiety that was not significantly different from either the competitive or non-exercising groups. Finkenberg and colleagues (1998), like the present study, found

that competitively exercising, college attending women reported significantly less social physique anxiety than non-competitively exercising, college attending women. In their study, the competitively exercising group mean score was 39.2 ± 6.2, and the non-exercising control group's mean score was 42.7 ± 6.0.

Overall, the population of the present study had a healthier, lower SPAS score than those seen in comparable populations. Why this is so is not known, but the mean dietary restraint score was also lower than is often seen in similar populations. The inclusion of the competitive exercisers in this study could account for some of this discrepancy as their mean score was lower than the other exercise groups, whose scores were more similar to those found in the literature. The competitive exercisers also reported significantly less concern than the other two groups, with differences between their current and ideal body sizes. These findings together suggest that competitively exercising women have more positive feelings about their bodies than women who do not compete. Unfortunately, due to the cross-sectional nature of this investigation, it is not known whether women who have better feelings about their bodies are drawn to competitive exercise, or whether competitive exercise causes women to experience their bodies more positively.

6. Relationships Among Exercise Habits, Food Attitudes, and Women's Feelings About Their Bodies

The null hypotheses regarding correlations amongst variables were all rejected in the present investigation. However, the pattern of relationships amongst variables differed for the exercising and non-exercising groups. The results for the three groups

pooled together will be discussed first, followed by discussions for each of the three exercise groups individually.

i. Relationships Amongst Variables for the Pooled Exercise Groups

The indices regarding women's feelings about their bodies were positively correlated with each other. Both methods of calculating body-size dissatisfaction had similar patterns of correlation with other study variables for the pooled population because these two methods were highly correlated with each other. The next strongest correlation was between the question regarding the degree of concern with the difference between an individual's current and ideal body size and social physique anxiety. This finding is new as a question directly asking about concern with the difference between current and ideal body sizes has not previously been included with such scales. Conceptually this makes sense as it would be likely that an individual who is concerned with/bothered by how her body differed from the ideal would be anxious about the appearance of her body in social settings. Also, SPA has consistently been associated with body dissatisfaction in the literature (Crawford & Eklund, 1994; Diehl et al., 1998; Eklund & Crawford, 1994; Frederick & Morrison, 1998; Kowalski et al., 2001; Petrie et al., 1996; Thompson & Chad, 2000; Thornton, Leo, & Alberg, 1991).

Correlated with both methods of calculating the Contour Drawing Rating Scale and social physique anxiety was BMI. This has also been found in other studies. For example, Gupta and colleagues (2001) found that the mean BMI scores differed between their two subject groups and when BMI was added into analyses as a covariate, it overpowered any effect of their main variables of interest (e.g. nationality) on body

dissatisfaction. Heatherton (1993) also found differences in BMI between his two groups, dieters and non-dieters, and he concluded that "although dieters did not have more stringent standards for body shape than non-dieters, there was a larger discrepancy between ideal and current shape for dieters owing to their greater body weights" (p.225). Social physique anxiety is known to increase with increasing body size as this association is consistently found in the literature (Diehl et al., 1998; Eklund & Crawford, 1994; Hart et al., 1989; Ransdell et al., 1998; Spink, 1992; Thompson & Chad, 2000; Treasure et al., 1998).

Interestingly, in the present investigation BMI was not correlated with the question regarding the degree of concern with differences between current and ideal body sizes. Therefore, it seems that the degree of concern that a woman has regarding the difference between her current and ideal bodies depends on something other than her current body size. This lack of significant correlation is surprising, as one might believe that degree of concern with perceived differences would increase the farther one's body size was from the ideal, i.e. the larger a women's BMI. Dietary restraint was also not associated with BMI; however, it was associated with the degree of concern with differences between current and ideal body size. In other words, for this population, women who were more concerned with how their bodies did not match their ideal reported more dietary restraint but, how large their bodies actually were was not associated with their concern or dietary restraint. Therefore, it was the psychological factor of concern, not the physical factor of BMI that was associated with eating attitudes. This finding lends strength to the theory that the socio-cultural context of North America influences women's feelings about their bodies and food attitudes, as

women's concern with how their bodies did not meet their ideal was irrespective of their actual body size. And, it was this concern that was correlated with dietary restraint, not BMI.

Of the factors measured by the TFEQ, dietary restraint and disinhibition were significantly correlated with more variables than was hunger. Hunger was only significantly correlated with disinhibition, total TFEQ score, and weakly correlated with SPAS scores. Stunkard and Messick (1985) when developing the TFEQ, found that hunger was correlated with disinhibition but not dietary restraint. A study involving 421 American adolescents also found that hunger and disinhibition were correlated (Williams, Michela, Contento, Gladis, & Pierce, 1996). A third study involving 326 Swedish women found the same result, that hunger and disinhibition were correlated (Lindroos et al., 1997). Unfortunately, the relationship between the SPAS and TFEQ has not been previously investigated; therefore, no comparisons can be made with the findings in the present investigation.

Disinhibition was correlated with every study variable. Therefore, the tendency to lose control of dietary restraint increased with an increase in women's negative feelings about their bodies and body size (BMI). Unfortunately, few studies report the results of the disinhibition factor of the TFEQ; therefore, there is little with which to compare the results of the present investigation. The results of two studies that did involve disinhibition were congruent with the results of the present investigation. Although Lindholm and Wilson (1988) did not directly report correlations, there was a concomitant increase in disinhibition, drive for thinness, and body dissatisfaction in their

study. Also, obese women reported higher disinhibition than non-obese women in a second investigation (Lindroos et al., 1997).

The definition of dietary restraint is the conscious control of dietary intake in order to meet/maintain a personally or socially imposed body weight. Therefore, it is not surprising that dietary restraint was positively correlated with body dissatisfaction measured by both the new and traditional methods of calculating the Contour Drawing Rating Scale and the degree of concern question. Dietary restraint was also positively correlated with social physique anxiety. Other studies have found similar results using the TFEQ and the Restraint Scale. Individuals with high dietary restraint (measured with the TFEQ) were more dissatisfied with their bodies (measured by the Body Shape Questionnaire) in the study by Lautenbacher and colleagues (1992). The same trend was seen but the difference did not reach significance in a later study using the Body Shape Questionnaire and the TFEQ lead by the same investigator (Lautenbacher et al., 1997). Body dissatisfaction (measured by the Body Shape Questionnaire) and restraint (measured by the Restraint Scale) were correlated in a study of 287 women by Paa and Larson (1998). Finally, direct correlation was not determined in the study by Lindholm and Wilson (1988), but there was a concomitant increase in dietary restraint measured by the TFEQ and body dissatisfaction measured by asking about satisfaction with a variety of specific body parts.

In the present study, dietary restraint was not correlated with BMI. This contradicts the findings of Davis and colleagues and Gendall and colleagues who both found that BMI was correlated with dietary restraint (Davis, Shapiro, Elliott, & Dionne, 1993; Gendall et al., 1998). Barr and colleagues (1994a) also found that restraint was

positively correlated with BMI. However, the present investigation's findings agree with those of other researchers. Lautenbacher and colleagues (1992) did not find a difference in BMI between their high and low dietary restraint groups, nor did Van Loan and Keim (2000), McLean and colleagues (2001), nor Barr and colleagues (1994b). The reason behind the differences found is not known. Perhaps the correlation sometimes seen between BMI and dietary restraint is spurious. Perhaps as the body-dissatisfaction results of the present investigation suggest, it is not the physical factor of BMI but the psychosocial factor of how one perceives her body that is related to dietary restraint. And, the larger one's BMI, the more likely one is to be dissatisfied with her body. But, as seen in this investigation, body-size dissatisfaction may not always be associated with BMI; therefore, causing dietary restraint to not always be associated with BMI.

Total exercise activity was significantly, negatively correlated with the traditional calculation method of body-size dissatisfaction using the Contour Drawing Rating Scale, the question regarding degree of concern, and social physique anxiety. These correlations reflect the findings that competitive exercisers had the lowest scores on these variables, as the competitive exercisers reported by far the most exercise. In contrast to the present investigation, correlations in the literature between exercise activity and SPA are weak at most. Amongst university women, SPA was weakly positively correlated with activity in one investigation (Kowalski et al., 2001). It was weakly negatively correlated with exercise activity in another study involving women from a wider age range (18-60 years) [Lantz et al., 1997]. Finally, Frederick and Morrison (1996) saw no difference in amount of exercise activity for women with high versus low SPA.

That a negative correlation between exercise activity and body-size dissatisfaction was seen is not surprising. In the literature, exercise is associated both positively and negatively with body image. In their review, Scully and colleagues (1998) concluded that exercise was associated with increased body dissatisfaction. Davis and colleagues (1990) found that dieters reported more exercise and greater body dissatisfaction than non-dieters. In a subsequent study they found that 70% of women with eating disorders reported being more physically active than their peers before they started to diet or developed an eating disorder (Davis et al., 1994). Similar results were seen in a study of women in the military (Lauder, Williams, Campbell, Davis, & Sherman, 1999). In that study, women diagnosed with eating disorders reported greater exercise activity and greater body-size dissatisfaction (Lauder et al., 1999). In contrast, athletes reported less body dissatisfaction than non-athletes in the study involving 158 women who attended university (Wilkins, Boland, & Albinson, 1991). Also, female tennis players were not found to have more body-size dissatisfaction than the general population in a study by Harris (2000). In fact, a weight-training program improved the body satisfaction of a group of 27 collegiate women (Williams & Cash, 2001). Perhaps it is how the women are grouped that indicates how exercise is associated with body dissatisfaction. In all of the studies where exercise was associated with poorer body image, study participants were grouped according to the presence or absence of dieting or disordered eating. It may be that exercise is associated with poorer body image only for a subset of women, that is women with disordered eating or who are dieting. When such women are not singled out, exercise is correlated with improved body satisfaction. Ryujin and colleagues (1999) who investigated female runners reached a similar

conclusion. They concluded that "such prevalence may be more likely only for a certain subset of these athletes. For other female distance runners, running may not have a negative effect. In fact it may even enhance physical and psychological health" (Ryujin et al., 1999, p.74). Why a subset of women responds differently is not known, but a discussion regarding a theoretical explanation will follow (section 8).

ii. Relationships Amongst Variables Within Exercise Groups

The pattern of correlations amongst study variables was almost identical for competitively and recreationally exercising women except for correlations involving exercise activity. Therefore, even though these two groups' mean scores on some measures differed significantly, the relationships amongst the food attitude and body variables were extremely similar to each other and to the pooled data previously discussed. These results support that for exercising women, whether competitive or recreational, food attitudes and feelings about their bodies are similarly related. However, when exercise enters the picture, women's food attitudes and feelings about their bodies differ between competitive and recreational exercisers. Also, the pattern of relationships amongst study variables, both with and without the inclusion of exercise activity, differed between exercising and non-exercising women. Unfortunately, no previous study has included separate analyses for competitive, recreational, and non-exercising women. Therefore, comparisons between the present findings and those in the literature are difficult.

Amongst the competitive exercisers, total exercise activity was significantly negatively correlated with social physique anxiety and the new and traditional methods

of calculating body-size dissatisfaction using the Contour Drawing Rating Scale. Because the traditional and new methods were so closely correlated with each other, it is not surprising that they were both correlated with total exercise activity. Perhaps increasing exercise is associated with smaller differences between current and ideal body sizes because increasing exercise produces a more lean, fit body which approaches the ideal. However, increasing exercise was not associated with a lower concern regarding differences between current and ideal body sizes, again suggesting that it is not the physical body but some other factor that determines concern..

Amongst recreational exercisers, unlike the other two exercise groups, total exercise was not significantly correlated with any variable. Perhaps, although many women recreationally exercise in order to manipulate their body size, increasing exercise activity does not alleviate these poor feelings about their bodies. Alternatively, there could be two groups of women within the recreationally exercising group whose correlations negate each other. Perhaps for some women, increasing exercise does alleviate these negative feelings about their bodies, but for other women exercise increases their focus on their bodies, highlighting how they differ from the ideal, and increasing the negative feelings about their bodies. A similar pattern of two groups whose correlations oppose each other could also be present for food attitudes. For some women, recreational exercise could 'free' them from restrained eating by increasing their caloric output. For other women, recreational exercise could be used in conjunction with restrained eating in an attempt to obtain the ideal body. Unfortunately, this quantitative study cannot identify the reasons behind the lack of correlations amongst variables for

the recreational exercisers. Perhaps another variable not included in this investigation would explain the exercise activity of recreationally exercising women.

The relationships between food attitudes and women's feelings about their bodies were differently organized amongst non-exercising women than the other two exercising groups. First, more non-exercising women wanted to be larger than their current body size, which caused the new and traditional methods of calculating body size dissatisfaction to be less strongly correlated with each other. Because the two calculation methods were not as closely correlated, they did not have as similar correlations with other variables as amongst the exercising groups. The new method was significantly correlated with dietary restraint and disinhibition, but the traditional method was not significantly correlated with either variable. Conversely, only the traditional method was significantly correlated with hunger. Therefore, when the direction of the difference between current and ideal size was taken into consideration, body-size dissatisfaction increased with an increase in dietary restraint and disinhibition. When individuals who wanted to be larger than their current size were grouped together with those who wanted to be smaller, this correlation disappeared. This makes conceptual sense, as women who want to be larger than their current size would not likely restrict their food intake in order to reach their goal, which is to be larger.

Another relationship that was different for non-exercising and exercising women was that found between total exercise and the new method for calculating body-size dissatisfaction using the Contour Drawing Rating Scale. These two variables were significantly positively correlated amongst non-exercising women. Therefore, exercise increased with an increase in the difference between non-exercisers' current and ideal

body sizes, when the individuals wanted to be smaller than their current size. Perhaps those individuals with large differences between their current (larger) and ideal (smaller) body sizes were starting to exercise in an attempt to decrease the discrepancy between their body sizes, but they were not yet planning exercise into their daily lives in order to be considered recreational exercisers.

Although a pattern of correlations was seen for the pooled population, the patterns differed between the two exercising groups, and between the exercise groups and the non-exercising group. It is evident that the organization of women's total exercise activity, food attitudes, and feelings about their bodies differ depending on exercise habits. Recreational and competitive exercisers had similarly related food habits and feelings about their bodies, but these two exercise groups differed when exercise activity was included in analyses. Non-exercisers' organization was different again from the other two exercise groups. Regression analyses, discussed next, continue the exploration of the structure of relationships amongst exercise habits, food attitudes, and women's feelings about their bodies.

7. Prediction of Eating Behaviour and Exercise Activity

Regression analyses were conducted to determine if dietary restraint, total TFEQ score, and total exercise activity could be predicted by the variables in the present study. The resulting prediction equations were different for each exercise group. This was expected, as the patterns of correlations amongst variables were different for each exercise group. Regression analyses were performed involving both the original and log transformations of disinhibition and total exercise activity.

i. Predicting Dietary Restraint

When the three exercise groups were pooled together, dietary restraint was best predicted by hunger, disinhibition, and the question regarding the degree of concern with the difference between current and ideal size. However, hunger and disinhibition did not remain in all the prediction equations when they were equated for the individual exercise groups. This provides only partial support for the idea that these three aspects of food attitudes are related.

The question regarding the degree of concern with differences between current and ideal size was the only measure of women's feelings about their bodies that entered the prediction equation for dietary restraint. Also, this variable was the only one that consistently remained in the dietary restraint prediction equations when individual equations were developed for each exercise group, and when log transformed variables were entered into the analyses. This lends support to the hypothesis generated by the correlational analyses, that the degree of concern with differences is more important for women's health than simply the size of the difference between current and ideal body sizes. Further, it was the degree of concern that was variable in the present investigation; whereas, the mean size of the difference between current and ideal body sizes was consistent amongst the exercise groups. In the literature, body dissatisfaction has previously been found to account for some of the variance in dietary restraint. Paa and Larson (1998) found that body dissatisfaction and negative affect entered the prediction equation for dietary restraint as measured by the Restraint Scale. Body

dissatisfaction was also key in the development of dietary restraint in the studies by Tiggemann (1994) and Cooley and Toray (2001).

Initially it was surprising that SPA did not enter the prediction equation for dietary restraint as it entered the prediction equation for eating disorder symptomatology in several studies involving similar populations to the preset investigation. In one study SPA accounted for 32% of the Eating Attitudes Test scores (Diehl et al., 1998). SPA also contributed to the prediction of Eating Attitude Test Scores in a second study involving collegiate women (Cox et al., 1997). In fact, in that study, SPA accounted for 50.5% of the variance in eating disorder symptomatology. Finally, SPA was involved in the prediction of Eating Disorder Inventory scores in a third study involving collegiate women (Frederick & Morrison, 1998). But in the present investigation, SPAS score and the degree of concern with differences between current and ideal body sizes were strongly correlated (Spearman's correlation coefficient for pooled population= 0.678), and the degree of concern did enter the prediction equation for dietary restraint. Therefore, the variance in dietary restraint that was predicted by the question regarding the degree of concern, could have accounted for any variance predicted by SPA, thus removing SPA from the prediction equation.

ii. Predicting Total TFEQ Score

Similar to the results for dietary restraint, the question regarding the degree of concern with differences between current and ideal body sizes entered the equations for total TFEQ score for the three exercise groups pooled together and individually. Also

like dietary restraint, amongst the non-exercising women, body-size dissatisfaction measured by the Contour Drawing Rating Scale entered the prediction equation. For the entire population, unlike the results for dietary restraint, SPAS also entered the equation, thus predicting some of the variance in total TFEQ score that the degree of concern question could not predict.

Again, these results point to the importance of how women react to (are concerned with/bothered by) perceived discrepancies between their current body size and their ideal body size. It is this reaction to their body's shortcomings that best predicted eating attitudes for women, regardless of their exercise habits and actual body size. Perhaps women with greater concern with the difference between their current and ideal body sizes are more susceptible to the socio-cultural context of North America. Gendall and colleagues (1998) did find that self-directedness (measured by the Temperament and Character Inventory) was negatively associated with total TFEQ score. Therefore, these women may find more direction from the socio-cultural context in which they live, as low self-directedness is characterized by a lack of internal organization, leaving individuals' behaviour to be determined by external circumstances (Gendall et al., 1998).

iii. Predicting Total Exercise Activity

Total exercise activity proved to be poorly predicted by the variables in the present investigation. Adjusted r^2 for the equations ranged from 0.053 to 0.214. The log transformation of total exercise activity was no better predicted than the original distribution.

The variables that entered the prediction equations for the original distribution of total exercise activity differed amongst the exercise groups. For the pooled population, being motivated for exercise by weight management best predicted total exercise activity, and weight management motivation was a negative predictor of total exercise activity. This finding simply reflects that the competitive exercisers exercised the most and few competitive exercisers chose weight loss/maintenance as their primary motivation for exercise. In fact, total exercise activity could not be predicted by the study variables for competitive exercisers. Perhaps for this group, total exercise has more to do with the nature of the sport in which they compete than women's feelings about their bodies and food attitudes.

Body related variables entered the prediction equations for the recreational and non-exercising groups, but they behaved differently for the two exercise groups. For recreational exercisers, BMI was the only variable to enter the prediction equation, and it was a negative predictor. In other words, lower BMI was associated with more exercise activity for this group. Both BMI and SPAS scores entered the prediction equation for non-exercising women. And, in contrast to the prediction equation for recreational exercisers, both BMI and SPAS scores were positive predictors of exercise activity. Therefore, for these two groups body size (and feelings about them) have a little to do with how much exercise individuals undertake; however, most of the variance in exercise activity remained unexplained by the variables included in the present investigation. This contradicts the findings by Lantz and colleagues (1997) who found that amount of exercise was best predicted by SPA, gender, and age. Age and SPA also entered the prediction equation for exercise adherence in a study by Treasure

and colleagues (1998). As gender was constant and age very limited in the present investigation, it was expected that SPAS would better predict exercise activity, but SPAS only entered the prediction equation for non-exercising women. However, Kowalski and colleagues (2001) did not find that SPA added to the prediction of exercise activity when self-perceptions of conditioning were entered into their prediction equation. Davis and colleagues (1990) found that body dissatisfaction and diet concerns did not predict physical activity, but that physical activity predicted body dissatisfaction.

iv. Conclusion

Taken together, the results from the regression analyses found that food attitudes (dietary restraint and total TFEQ score) can be predicted by body-size dissatisfaction. However, total exercise activity was not well predicted by women's food attitudes and feelings about their bodies. Each exercise group had different variables entering each prediction equation, and in the case of BMI, it entered as a positive predictor in one exercise group's equation but as a negative predictor in another group's equation. This can help to explain some of the mixed findings in the literature. Most previous studies did not separate participants into competitive, recreational, and non-exercising groups; therefore, a variety of findings is expected.

8. Relating Study Results to Objectification Theory

Objectification theory states that all women in North America are exposed to the pressure to attain an ideal body. Yet, the present investigation revealed variability in how

women responded to this cultural pressure. The present investigation found that how much women are concerned with/bothered by the difference between their body size and their ideal body size was stronger than the perceived difference between current and ideal body size for determining how exercise relates to eating behaviour. Therefore, the present investigation does not fully support objectification theory. This investigation suggests that women vary in how much importance they place on this cultural pressure, that is how much it bothers or concerns them.

Self-directedness is the term used to describe how much an individual's behaviour is determined by internal or external cues (Gendall et al., 1999). Individuals with the character trait of high self-directedness rely on personal goals to determine their behaviour; whereas, individuals with low self-directedness rely on external circumstances (Gendall et al, 1999). Therefore, perhaps although all women in North America live within the same socio-cultural context, personality (including self-directedness) influences how they respond to and behave within this socio-cultural context.

9. Summary

Combining the results from the SPAS scale and the question regarding degree of concern about differences between current and ideal body sizes, it seems that competitive exercisers have more positive feelings about their bodies than recreational and non-exercising women. The recreational and non-exercising women did not score significantly different from one another on either of these measures. Therefore, although recreational exercisers are motivated to exercise primarily by body appearance

related factors, they do not have more positive feelings about their bodies than women who do not exercise. Women who were motivated for exercise by weight loss/maintenance (most of whom were recreational exercisers) also reported poorer food attitudes and feelings about their bodies. Increasing the amount of exercise did not improve these feelings for recreationally exercising women, as total exercise was not correlated with any body experience variable.

Correlational analyses identified that the three exercise groups had different patterns of correlations amongst exercise habits, food attitudes, and feelings about their bodies. The patterns of association were especially different for social physique anxiety and total exercise activity. Social physique anxiety was correlated with few variables for the non-exercising group. This was in contrast to the results for the exercising groups in the present investigation and those found in previous studies. While exercise activity was positively correlated with body-size dissatisfaction (measured by the new method of scoring the Contour Drawing Rating Scale) amongst non-exercising women, it was negatively correlated with body-size dissatisfaction amongst competitively exercising women, and there were no significant correlations amongst recreationally exercising women.

The regression results strengthen the findings of the correlational analyses. In many cases, the interrelationships amongst total exercise activity, food attitudes, and women's feelings about their bodies differed amongst competitive, recreational, and non-exercising women. Body-size dissatisfaction was involved in the prediction of dietary restraint and total TFEQ score. It was the degree of concern with the difference (not the size of the difference) between current body size and ideal body size that best

explained the variance in eating attitudes. Total exercise activity, on the other hand, was poorly predicted by women's feelings about their bodies and body size. In fact, for competitive exercisers, total exercise activity could not be predicted with the variables included in this investigation.

Objectification theory is not fully supported by these results. It is hypothesized that character traits, specifically self-directedness, may mediate the effect of the socio-cultural context on women's behaviours.

10. Study Limitations

i. Sampling

Several sampling limitations should be noted when considering the results of the present investigation. First, all information was gathered by self-report from a self-selected population. There is always the potential for survey respondents to differ from the general population. Self-selection also affected the distribution of activities in which exercisers competed. For example, a large proportion (30.7%) of the competitive exercisers belonged to the UBC ice hockey team. Ice hockey is a fairly new sport for women to compete in; therefore, these women may have unique characteristics that affect the present investigation's results and limit its generalizability.

Second, the target population was specifically chosen to control for factors known to influence women's food attitudes and feelings about their bodies such as socioeconomic status and age. A consequence of this is that it limits the generalizability of the findings to other populations. However, the inclusion of competitive, recreational, and non-exercising women allows for the application of

results to a wider population of women attending university than is usually included in such investigations in the exercise literature. Unfortunately information on ethnicity was not gathered from participants; therefore, any effect of it on study results was not determined.

Lastly, individuals who had been diagnosed with or treated for an eating disorder were excluded from the study. Therefore, when considering the results one must remember that they are only generalizable to a population without clinical eating disorders. The potential for individuals to have eating disorders, regardless of exercise habits, cannot be ignored.

ii. Study Design

The cross sectional design of the study precludes the ability to investigate causes of the relationships found. It cannot be determined whether exercise causes the differences seen amongst various variables or whether individuals with differences in food attitudes and feelings about their bodies are drawn to differing exercise habits. However, this study has determined that the exercise groups are unique; therefore, future work should treat the three groups as such.

11. Directions for Future Research

Regardless of the study limitations expressed, there remains considerable value in the present investigation, as it opens the door for future studies. Investigations are now needed into the causal direction of the relationships discovered herein. For example, why are competitive exercisers sheltered to some extent from the negative

effects of the socio-cultural context of North America on women's food attitudes and feelings about their bodies? Also, why did this investigation only find differences in dietary restraint, and not body feelings between recreationally exercising and non-exercising women?

On a methodological note, investigations need to confirm what the Contour Drawing Rating Scale and other similar scales are measuring, and whether this is in fact a measure of dissatisfaction with body-size or merely a reflection of socio-cultural ideals. This information could help to untangle the complicated findings in the body image literature.

12. Implications for Professional Practice

This study confirmed that many women who recreationally exercise are motivated to do so by weight loss/maintenance. It also found that such motivated women reported poorer food attitudes and feelings about their bodies. Although the physiological benefit of exercise is undisputed, professionals involved in recreational exercise and its promotion need to be aware of the potential for harm. There is a need to motivate women to exercise without promoting this focus on body size manipulation and the associated negative food attitudes. There also is a need to identify women who are focused on manipulating their bodies and to intervene, allowing them to receive only the positive effects of physical activity. How this should be done is not yet determined. However, the degree of concern with differences between current and ideal body size (and not the size of the discrepancy) may be an important step in identifying those at risk.

Although competitive exercisers seemed protected to some degree from the negative associations of exercise, widespread promotion of competitive exercise for women should not yet be undertaken for this reason. The present investigation was not designed to determine whether competitive exercise caused improved feelings about bodies or whether women who feel positively about their bodies are drawn to competitive exercise. Much work still needs to be done to tease out the meaning of the relationships identified in this investigation.

CHAPTER VI

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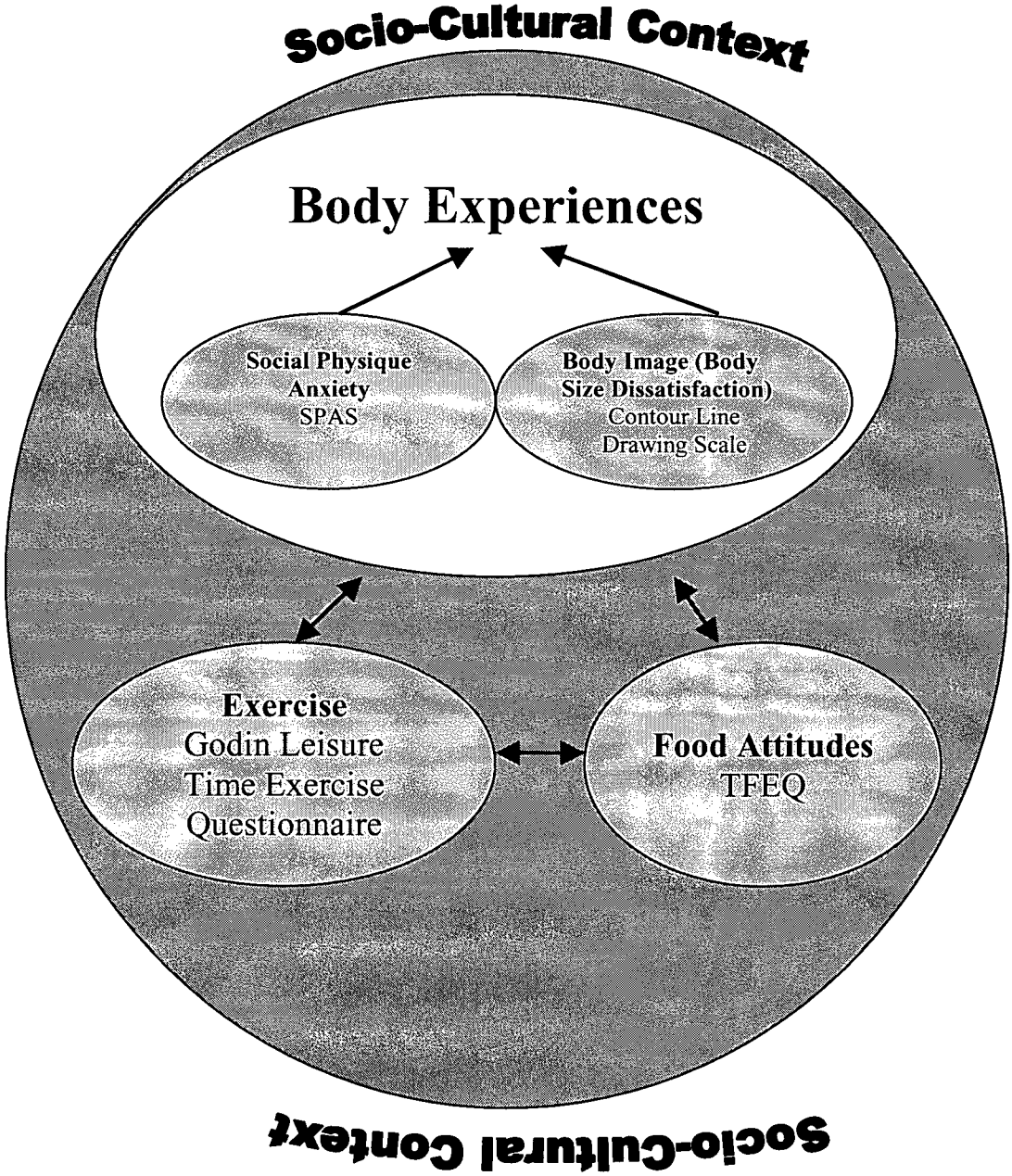
Appendix 1

Flowchart of Study Constructs with Measures



Appendix 5

THE UNIVERSITY OF BRITISH COLUMBIA

Faculty of Agricultural Sciences
Food, Nutrition and Health
Suite 230, 2205 East Mall
Vancouver, BC Canada V6T 1Z4
Tel: (604) 822-2502
Fax: (604) 822-5143

Coach's Name
Address
Etc, etc

August 20, 2001

Dear Coach,

Women's feelings about their bodies and their eating habits are hot topics. Female athletes however, have a special relationship with their bodies. A female athlete's body is the vehicle for her athletic success. Does this protect these women from society's pressures? Does this add more pressure? How does this interact with eating habits? Much is not known about how female athletes feel about their bodies and food compared to women who are not competitive athletes.

My name is Kristen Yarker. I am a graduate student conducting a survey called Exercise Habits, Food Attitudes, and Women's Feelings About Their Bodies. As the name suggests, the survey investigates the interaction between exercise, food habits and body image for women in a unique way. The study has been approved by The UBC Office of Research Services and Administration's Behavioural Research Ethics Board. My supervising committee includes Dr. Susan I. Barr, Dr. Heather MacKay, and Dr. Gwen Chapman.

As a coach you have a unique position in the lives of athletes. I am asking for your help in contacting female athletes to participate in this study. The survey takes only 20 minutes and is completed on the athletes' own time. You can help in one of two ways:

- ✓ Allow me to come to a team meeting to explain the study and distribute it to those who wish to participate
- ✓ Distribute the flyers yourself and ask your athletes to participate if they wish to do so.

Appendix 6

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Office Use only
#

Exercise Habits, Food Attitudes and Women's Feelings About Their Bodies

- Thank you for your interest
- Please be sure to answer all questions as truthfully as possible
- Your responses will be strictly confidential

Part I

Considering a 7-**Day Period** (a week), how many times on the average do you do the following kinds of exercise for **more than 15 minutes** (write on each line the appropriate number).

	Times Per Week	**Average Minutes Per Session**
1.		
a) STRENUOUS EXERCISE (HEART BEATS RAPIDLY) (i.e. running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming vigorous long distance bicycling)	_____	_____
b) MODERATE EXERCISE (NOT EXHAUSTING) (i.e. fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)	_____	_____
c) MILD EXERCISE (MINIMAL EFFORT) (i.e. yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking)	_____	_____

2. Considering a 7-Day period (a week), during your leisure-time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

OFTEN	SOMETIMES	NEVER/RARELY
_____	_____	_____

Please answer the following questions by filling in the blanks.

Do not use

3. Do you plan exercise into your day?

_____ YES _____ NO _____

If you answered **YES** move on to **question 4**.

If you answered **NO** please skip to **PART II** (page 4).

4. Why do you exercise? Rank your top 3 reasons by using **1** for the most important reason, **2** for the second most important and **3** for the third most important reason.

Competition_____ _____
Health_____ _____
Stress relief _____ _____
Lose or maintain weight _____ _____
Socialize with friends _____ _____
Fitness and toning _____ _____
Other_____ Please specify_____ _____
_____

5. What type(s) of exercise do you participate in?

_____ _____
_____ _____
_____ _____
_____ _____

2

6. Do you belong to any UBC Varsity teams?

_____ YES _____ NO _____

If **YES**, which UBC Varsity team(s) do you belong to?

_____ _____

_____ _____

_____ _____

7. Are you involved in competitive sport outside of UBC Varsity sports?

_____ YES _____ NO _____

If **YES**, which sports do you participate in?

_____ _____

_____ _____

_____ _____

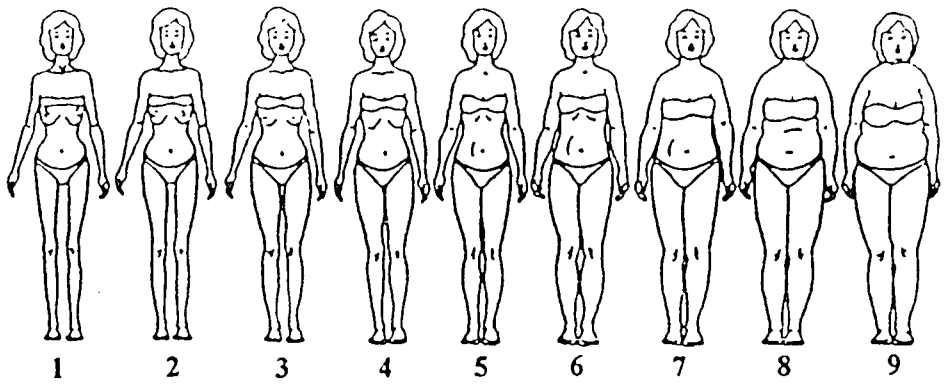
8. Do you belong to any UBC intramural teams?

_____ YES _____ NO _____

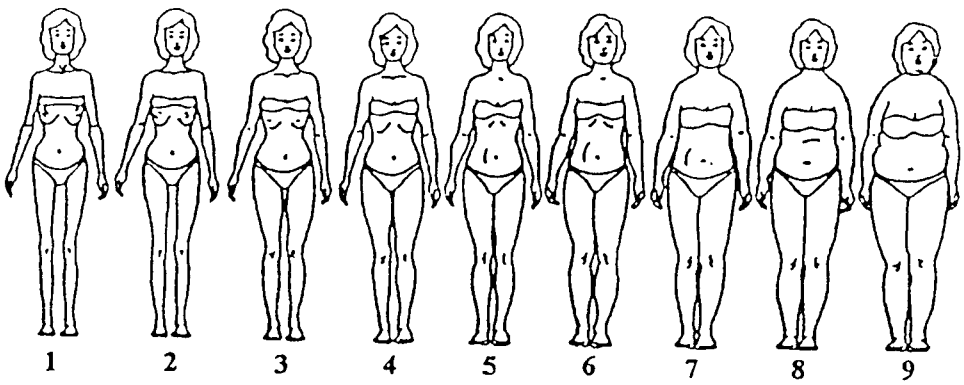
Part II.

Please circle the number below the drawing that most closely resembles

<u>your current body size</u>



Please circle the number below the drawing that most closely resembles what you wish to look like.



If there is a difference between your current and your wished for figure, how much does this difference bother or concern you?

1	2	3	4	5	6
not at all	slightly	moderately	very	extremely	not applicable

Part III

Please circle whether the statements below are true (T) or false (F) for you.

			Do not use
1. When I smell the aroma of my favourite food, I find it very difficult to keep from eating, even if I have just finished a meal	T	F	____
2. I usually eat too much at social occasions, like parties and picnics	T	F	____
3. I am usually so hungry that I eat more than three times a day	T	F	____
4. When I have eaten my quota of calories, I am usually good about not eating any more	T	F	____
5. Dieting is so hard for me because I just get too hungry	T	F	____
6. I deliberately take small helpings as a means of controlling my weight	T	F	____
7. Sometimes things just taste so good that I keep on eating even when I am no longer hungry	T	F	____
8. Since I am often hungry, I sometimes wish that while I am eating, an expert would tell me that I have had enough or that I can have something more to eat	T	F	____
9. When I feel anxious, I find myself eating	T	F	____
10. Life is too short to worry about dieting	T	F	____
11. Since my weight goes up and down, I have gone on reducing diets more than once	T	F	____
12. I often feel so hungry that I just have to eat something	T	F	____
13. When I am with someone who is overeating, I usually overeat too	T	F	____
14. I have a pretty good idea of the number of calories in common food	T	F	____
15. Sometimes when I start eating, I just can't seem to stop	T	F	____
16. It is not difficult for me to leave something on my plate	T	F	____
17. At certain times of the day, I get hungry because I have gotten used to eating then	T	F	____
18. While on a diet, if I eat food that is not allowed, I consciously eat less for a period of time to make up for it	T	F	____

6

19. Being with someone who is eating often makes me hungry enough to eat also ..... T F ____

20. When I feel blue, I often overeat ..... T F ____

21. I enjoy eating too much to spoil it by counting calories or watching my weight ..... T F ____

22. When I see a real delicacy, I often get so hungry that I have to eat right away ..... T F ____

23. I often stop eating when I am not really full as a conscious means of limiting the amount I eat ..... T F ____

24. I get so hungry that my stomach often seems like a bottomless pit ..... T F ____

25. My weight has hardly changed at all in the last two years ..... T F ____

26. I am always hungry so it is hard for me to stop eating before I finish the food on my plate ..... T F ____

27. When I feel lonely, I console myself by eating ..... T F ____

28. I consciously hold back at meals in order not to gain weight ..... T F ____

29. I sometimes get very hungry late in the evening or night ..... T F ____

30. I eat anything I want, any time I want ..... T F ____

31. Without even thinking about it, I take a long time to eat ..... T F ____

32. I count calories as a conscious means of controlling my weight ..... T F ____

33. I do not eat some foods because they make me fat ..... T F ____

34. I am always hungry enough to eat at any time ..... T F ____

35. I pay a great deal of attention to changes in my figure ..... T F ____

36. While on a diet, if I eat a food that is not allowed, I often then splurge and eat other high calorie food ..... T F ____

7

Part IV

Please answer the following questions by circling the number above the response that is appropriate to you.

37. How often are you dieting in a conscious effort to control your weight? ____

1	2	3	4
rarely	sometimes	usually	always

38. Would a weight fluctuation of 5lbs affect the way you live your life? ____

1	2	3	4
not at all	slightly	moderately	very much

39. How often do you feel hungry? ____

1	2	3	4
only at meals	sometimes between meals	often between meals	almost always

40. Do your feelings of guilt about overeating help you to control your food intake? ____

1	2	3	4
never	rarely	often	always

41. How difficult would it be for you to stop eating halfway through dinner and not eat for the next four hours? ____

1	2	3	4
easy	slightly difficult	moderately difficult	very difficult

42. How conscious are you of what you are eating? ____

1	2	3	4
not at all	slightly	moderately	extremely

43. How frequently do you avoid 'stocking up' on tempting foods? ____

1	2	3	4
almost never	seldom	usually	almost always

44. How likely are you to shop for low calorie foods? ____

1	2	3	4
unlikely	slightly likely	moderately likely	very likely

45. Do you eat sensibly in front of others and splurge alone? ____

1	2	3	4
never	rarely	often	always

46. How likely are you to consciously eat slowly in order to cut down on how much you eat?

1	2	3	4	
unlikely	slightly likely	moderately likely	very likely	____

47. How frequently do you skip dessert because you are no longer hungry?

1	2	3	4	
almost never	seldom	at least once/week	almost daily	____

48. How likely are you to consciously eat less than you want?

1	2	3	4	
unlikely	slightly likely	moderately likely	very likely	____

49. Do you go on eating binges though you are not hungry?

1	2	3	4	
never	rarely	sometimes	at least weekly	____

50. On a scale of 0 to 5, where 0 means no restraint in eating (eating whatever you want, whenever you want it) and 5 means total restraint (constantly limiting food intake and never 'giving in'), what number would you give yourself? (please circle the number)

0 eat whatever you want, whenever you want it
1 usually eat whatever you want, whenever you want it
2 often eat whatever you want, whenever you want it
3 often limit food intake, but often 'give in'
4 usually limit food intake, rarely 'giving in' ____
5 constantly limit food intake, never 'giving in'

51. To what extent does this statement describe your eating behaviour? "I start dieting in the morning, but because of any number of things that happen during the day, by evening I have given up and eat what I want, promising myself to start dieting again tomorrow."

1	2	3	4	
not like me	a little like me	pretty good description of me	describes me perfectly	____

Part V.

Read each question carefully. Please answer the following questions by indicating the degree to which the statement is characteristic or true of you.

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

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

53. I never worry about wearing clothes that might make me look too thin or overweight

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

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

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

55. Sometimes I worry that other people think negatively about my weight or muscular development

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

56. When I look in the mirror I feel good about my physique

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

57. My physique makes me nervous in certain social settings

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

58. In the presence of others, I worry about my physique

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

59. I am comfortable with how my body appears to others

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

Please turn page over to complete the last page

10

60. It would make me uncomfortable to know others are evaluating my physique

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

61. When it comes to displaying my physique to others, I am a shy person

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

62. I usually feel relaxed when others are looking at my physique

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

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

1	2	3	4	5	
not at all	slightly	moderately	very	extremely characteristic	____

Part VI. Information About You

The following information will help us interpret the results of the questionnaire. It's very important that all questions are completed. If you don't know the exact value for any of the questions, give us your best estimate. Thank you!

Do you attend the University of British Columbia? _____YES _____NO ____

What is your current age? _____ years ____

How tall are you (without shoes)? _____cm **or** _____ feet, _____inches ____

What is your current weight (without clothes)? _____ kg **or** _____lbs ____

Finished! Please be sure that you have answered all questions. Thank you!

Appendix 7

THE UNIVERSITY OF BRITISH COLUMBIA

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Food, Nutrition and Health
Suite 230, 2205 East Mall
Vancouver, BC Canada V6T 1Z4
Tel: (604) 822-2502
Fax: (604) 822-5143

Explanatory Letter

December 20, 2000

Dear Participant,

Thank you for your interest in our study: Exercise Habits, Food Attitudes and Women's Feelings About Their Bodies. Our feelings about our bodies are influenced by many factors. How we feel about our bodies can be related to our relationships with food and exercise. This study is intended to gain insight into how feelings about one's body, eating habits and exercise behaviour interact. Information gained from this study may help health professionals plan and promote physical activity programs.

The enclosed questionnaire has been designed to help the investigators, Dr. Susan Barr (Principal Investigator, Faculty of Agriculture) and Kristen Yarker (Co-Investigator - a Masters student) explore this relationship between feelings about our bodies, exercise and eating. This study is being done in order for Kristen Yarker to meet the requirements of a Masters of Science degree.

The questionnaire should take approximately 20 minutes to complete. All responses are strictly confidential. Do not write your name on the questionnaire. All questionnaires will be identified by code number and kept in a locked filing cabinet. Participants will not be identified by name at any point.

There is no obligation to complete and return the questionnaire. You may refuse to participate and not return the questionnaire at any point. But, by completing and returning this questionnaire, it is assumed that you give your consent for its use in the study.

Please return the completed questionnaire in the addressed, stamped envelope provided. If we do not receive your completed questionnaire one month after administration, we will send you a postcard as a reminder.

Appendix 8

Contact Information for Study Results (Optional)

If you have completed the questionnaire in full and would like to be entered in the cash draw and/or receive by mail a summary of the study results, please fill out this page.

Thank you!

NAME:_____

PRESENT ADDRESS (including city and postal code):_____

_____

_____

_____

PERMANENT ADDRESS (including city and postal code):_____

_____

_____

_____

PRESENT TELEPHONE NUMBER_( )_____

PERMANENT TELEPHONE NUMBER___( )_____

___ **Yes, please enter me in the draw for:**

1 prize of $100
2 prizes of $50
4 prizes of $25

___ **Yes, please send me a copy of a summary of the study results**

Appendix 9

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Office use only
1397
Date (yr/mo/d): ___/___/___

Please complete the following information. If your completed questionnaire is not returned in one month from today, this information will be used to send you a postcard reminding you of the questionnaire.

NAME:_____

MAILING ADDRESS (including city and postal code):_____

_____

_____

_____

Summary of Results

Purpose of the study:
This study's primary purpose was to determine whether women who exercised had more positive body experiences and eating attitudes than women who did not exercise. A secondary purpose was to determine whether women who exercised competitively had different body experiences and food attitudes than women who exercised recreationally. I also wanted to know what motivated women to exercise and whether women who exercised competitively were motivated by different reasons than recreationally exercising women.

Response:
One hundred and ninety eight women UBC students returned questionnaires. Individuals were placed into non-exercising, recreationally exercising, and competitively exercising categories based on whether they indicated that they planned exercise into their day, the amount of exercise they reported, and whether they participated in UBC varsity sports or other competitive sports outside of UBC. One hundred and sixty six women fit into these categories including 52 competitive exercisers, 61 recreational exercisers, and 53 non-exercisers.

Demographics:
The average age of study participants was 21.72 ± 3.60 (mean ± standard deviation). Body mass index (BMI) was calculated from individuals' heights and weights. Values in the range of 20 – 25 are considered healthy or at the lowest risk for a variety of diseases. The mean BMI for the entire study was 21.14 ± 2.44 kg/m^2 and there were no differences in BMI among the exercise groups. However, the competitively exercising group was significantly taller than the other two groups. This probably reflects the basketball and volleyball players included in this group who returned surveys.

Exercise:
Women in each exercise group reported a wide variety of exercise activities, with many people indicating that they participated in more than one activity (see figure).

Among competitively exercising women, competition was the most common primary motivation for exercise, fitness/toning was the most common secondary and tertiary motivations for exercise. For recreationally exercising women, the most common primary motivation for exercise was weight management, fitness/toning the most common secondary motivation, and health the most common tertiary motivation for exercise

Body Experience:
Women's feelings about their bodies were measured by two parts of the questionnaire. The first part involved circling which picture resembled how one currently looked and a picture of how one would like to look. Then it was asked how much this difference (if any) bothered or concerned individuals. On average people wanted to be about one

drawing different than their current drawing (mean ± standard deviation, 1.1 ± 1.1). People wanted to be both larger (7.6% of respondents) and smaller (73.2%) and 18.8% of respondents felt that their current size was their ideal size. Women in the competitively exercising group were less concerned by differences between their current and ideal drawing choices than the recreationally exercising and non-exercising groups. The recreationally and non-exercising groups were similarly concerned by differences between their two drawings.

The second measure of body experience involved questions regarding feelings when others are looking at one's physique or body shape. The competitively exercising women reported less worry about others seeing their body than the non-exercising women. The recreationally exercising and non-exercising women did not worry a significantly different amount from each other.

Food Attitudes:
Women in the different exercise groups did have different attitudes towards food from one another. The recreationally exercising women as a group reported a higher average amount of cognitive control over eating than the other two exercising groups; that is, they were more aware of what and how much they ate, and were more likely to try to limit their food intake. Competitive exercisers and non-exercisers were not different from each other with respect to eating behaviour.

Associations Between Body Experience and Food Attitudes:
As expected, the two measures of body experience were found to be positively related so that individuals with larger differences between their current and ideal figures had more worries about having their bodies seen by others.

Eating attitudes were positively related to body experience. Individuals who had positive feelings about their bodies were more likely to have positive food attitudes and the same was true vice versa.

Conclusions:
The recreationally exercising and non-exercising women had similar body experiences. They were similarly concerned about differences between how they currently looked and wished to look and how much they worry about how others perceive their bodies. Competitively exercising women were less concerned about differences between current and ideal figures and how others perceive their bodies. Interestingly, it was competitively exercising and non-exercising women who had similar food attitudes. Recreationally exercising women, as a group, expressed more cognitive control over their eating. As expected, body experience and food attitudes were positively associated with each other for the study population as a whole. Therefore, people who had more positive eating attitudes had less concern and worry about their bodies regardless of which exercise group to which they belonged.

THANKS AGAIN FOR YOUR PARTICIPATION!

Figure 1: Reported Activities