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Health or harm? Exercise dependence and its effects on body satisfaction and self-esteem

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HEALTH OR HARM?

EXERCISE DEPENDENCE AND ITS EFFECTS ON

BODY SATISFACTION AND SELF-ESTEEM

by

Ian J. Bishop

A Thesis
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Health or Harm? Exercise Dependence and its Effects on

Body Satisfaction and Self-Esteem

by

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Abstract

The purpose of the present study was to better understand the inconsistent outcomes of exercise and exercise dependence on body satisfaction and self-esteem. Ninety-nine women completed measures assessing exercise dependence (i.e., excessive and compulsive exercise), reasons for exercising, positive and negative perfectionism (i.e., whether high standards are pursued to achieve positive outcomes or to avoid negative ones, respectively), body satisfaction, and self-esteem. A series of mediation analyses, hierarchical regression analyses, and a path analysis revealed that women who are positive perfectionists experience better body satisfaction and self-esteem in association with exercise, and women who are negative perfectionists experience worse. Further, it was determined that a combination of high levels of both exercise dependence and positive perfectionism was associated with better body satisfaction. Additionally, the motivation to exercise out of a desire to improve appearance and control weight mediated the relationships between exercise dependence and both perfectionism types.

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Chapter I

INTRODUCTION

Overview

Physical exercise is commonly associated with a wide variety of psychological

benefits (Penedo & Dahn, 2005). Exercise is, however, not always beneficial and can

even lead to harm, particularly when the amount of exercise a person engages in starts

becoming excessive (Morgan, 1979). And yet, even in the case of excessive exercise the

psychological outcomes are not always deleterious, and can in some situations provide

mental health benefits to those that participate in it (Hausenblas & Fallon, 2006; Spence,

McGannon, & Poon, 2005). In order to prevent the ill-effects of exercise, it is important

to try to understand the different paths that might lead from exercise to improved

psychological well-being in one circumstance, and from exercise to harmful

repercussions in another. To prevent gender from confounding the results, this study will

include only women.

Empirical Review

Exercise Dependence

Exercise is generally considered to be a healthy activity, and regular physical

activity has been linked to a host of both physical and psychological benefits. For

example, exercise benefits cardiovascular health, helps to stave off a number of diseases

(Penedo & Dahn, 2005), and leads to improvements in depression, anxiety and mood

(Scully, Kremer, Meade, Graham, & Dudgeon, 1998). Some people however, take

exercise to an unhealthy extreme where exercise becomes excessive and compulsive (de

Coverley Veale, 1987), and is engaged in regardless of negative consequences, such as

interpersonal or vocational problems and physical injury (Morgan, 1979). De Coverley

Veale (1987) termed this excessive and compulsive form of exercise "exercise

dependence," and provided diagnostic criteria for it. The criteria he proposed were based

largely on the diagnostic criteria used for other types of dependencies, such as the

tolerance and withdrawal found in addictions like alcoholism (Edwards, Gross, Keller,

Moser, & Room, 1977), but he also included criteria that assessed the psychosocial

impact of exercise dependence, such as increased time spent exercising at the expense of

other activities. The criteria he proposed are:

(A)   *Narrowing of repertoire leading to a stereotyped pattern of exercise with*

   a regular schedule once or more daily.

(B)   *Salience with the individual giving increasing priority over other activities*

   to maintaining the pattern of exercise.

(C)   *Increased tolerance to the amount of exercise performed over the years.*

(D)   *Withdrawal symptoms related to a disorder of mood following the*

   cessation of the exercise schedule.

(E)   *Relief or avoidance of withdrawal symptoms by further exercise.*

(F)   *Subjective awareness of a compulsion to exercise.*

(G)   *Rapid reinstatement of the previous pattern of exercise and withdrawal*

   symptoms after a period of abstinence.

Associated Features

(H)   *Either the individual continues to exercise despite a serious physical*

   disorder known to be caused, aggravated or prolonged by exercise and is

advised as such by a health professional, or the individual has arguments

or difficulties with his partner, family, friends, or occupation.

(I)   *Self-inflicted loss of weight by dieting as a means towards improving*

performance. (de Coverley Veale, 1987, p. 736)

Primary vs. secondary exercise dependence. De Coverley Veale (1987) also

instructed that a distinction must be made between exercise dependence where the

exercise itself is the motivation for the compulsive physical activity, and exercise

dependence with the primary purpose of losing weight or preventing weight gain.

Excessive exercise is a common symptom of eating disorders, such as anorexia nervosa

and bulimia nervosa, and is engaged in out of an effort to control weight along with other

activities, such as self-starvation, vomiting, and the use of laxatives and diuretics

(Anderson & Bulik, 2004). As excessive exercise of this nature is only secondary to the

eating disorder, De Coverley Veale termed it *secondary exercise dependence*, in contrast

to *primary exercise dependence*, where the exercise is an end in itself. People with

primary exercise dependence may also desire to lose weight through exercise and

additionally engage in other behaviours such as dieting in order to achieve this, but the

weight loss is pursued in an effort to improve their physical performance, rather than out

of concerns regarding their appearance (de Coverley Veale).

Inconsistent Outcomes of Excessive Exercise

A great deal of research has looked at the positive and negative psychological

consequences of exercise, whether excessive or not. For instance, a review of the

psychological outcomes associated with exercise determined that exercise helps to

alleviate depression, reduce anxiety, improve mood, and may also be of therapeutic

benefit to those suffering from a mental disorder (Scully, Kremer, Meade, Graham, & Dudgeon, 1998). However, excessive exercise has been found to lead to negative outcomes such as physical injury, limited social and vocational functioning, and withdrawal symptoms if workouts are missed (Morgan, 1979). Primarily, the positive aspects of exercise appear to be related to lower frequencies and intensities of exercise, and the more negative aspects tend to occur alongside exercise that becomes excessive and compulsive. Even so, this body of research has resulted in some common inconsistencies. For instance, whether body satisfaction and self-esteem are improved or worsened by physical activity varies widely between different studies' findings.

Body satisfaction. Body-image is a multidimensional construct; it is made up of the attitudes, perceptions, and behaviours individuals have in relation to their bodies. The attitudinal component of body image involves both an investment part and an affective part. Body image investment refers to the importance people place on their appearance, and the degree of effort they put into maintaining and improving it (Cash, 2002; Cash, Melnyk, & Hrabosky, 2004). The affective part refers to the level of satisfaction a person feels in regards to their appearance (Cash, 2002; Cash, Melnyk, & Hrabosky, 2004). People can be either satisfied or dissatisfied with their bodies to varying degrees. Body dissatisfaction can lead to poor psychological adjustment (Cash & Pruzinsky, 1990), and predicts excessive dieting (Stice, Mazotti, Krebs, & Martin, 1998), eating disorder symptoms (Johnson & Wardle, 2005), eating disorders (Garner, Garfinkel, Rockert, & Olmsted, 1987), low self-esteem, stress, and depression (Johnson & Wardle, 2005). Therefore it is important to understand the factors that contribute to body dissatisfaction in order to try and prevent these problems from occurring, or at least to ameliorate them

when they do. In addition, among exercisers, it would be beneficial for the purposes of treatment and prevention to be able to determine which individuals are at an increased risk of developing body dissatisfaction.

Self-esteem. Self-esteem refers to individuals' self-evaluations of their level of worth as human beings (Rosenberg, 1965). A critical review of the literature revealed that high self-esteem is linked to increased happiness, improved self-regulation, and potentially leadership ability as well (Baumeister, Campbell, Krueger, & Vohs, 2003). In contrast, low self-esteem has been found to lead to negative outcomes such as unhappiness (Freedman, 1978), anxiety (Baumeister, 1993), and an increased risk for eating disorders (Baumeister, Campbell, Krueger, & Vohs, 2003). Therefore, it is also important to understand the characteristics of exercisers that may contribute to their either experiencing increases or decreases in their self-esteem.

Inconsistencies in body satisfaction. A meta-analysis by Hausenblas and Fallon (2006) reviewed 121 published and unpublished studies that examined the effects of exercise on body satisfaction. They concluded that: 1) people who exercise tend to exhibit greater body satisfaction than people who do not; 2) people have better body satisfaction following an exercise intervention than controls who did not receive the intervention; 3) people who engaged in a program of exercise over time improved their body satisfaction over the duration of the program; and 4) more strenuous exercise was associated with an even larger improvement in body satisfaction. The positive effect of exercise on body satisfaction was seen regardless of how frequently participants exercised (Hausenblas & Fallon, 2006), and it seems from the compiled exercise characteristics reported by the authors that many of the participants in the various studies

could be described as excessive exercisers. Certainly then, the results of the meta-analysis suggest that exercising across a wide range of frequencies and intensities improves individuals' body satisfaction.

This connection between exercise and improved satisfaction with one's appearance has also led to the development of therapeutic exercise treatments for individuals suffering from body image disturbance, and has been shown to be as effective for engendering body satisfaction as cognitive-behavioural therapy designed specifically for such a population (Fisher & Thompson, 1994). Further, research into the withdrawal effects from stopping exercise among those who run regularly, has shown that runners who were prevented from running for a period of four weeks or more due to a running-related injury exhibited greater body dissatisfaction than a group of runners who were able to continue their regular exercise routines (Chan & Grossman, 1988). Lastly, research on the exercise behaviours of university students, found that greater frequency and intensity of exercise led to greater improvements in body satisfaction, but only for males (Hausenblas & Fallon, 2002). Therefore, an argument that exercise improves individuals' perceptions of their appearance would certainly have empirical support. However, the research findings regarding the outcomes of exercise remain inconclusive.

Conversely, a number of studies have found quite the opposite: that exercise is associated with body dissatisfaction. When British school children ($N = 276$) were classified into very inactive ($n = 49$), inactive ($n = 124$), moderately active ($n = 66$), and active ($n = 37$) groups based on their level of physical activity, a relation emerged between their level of physical activity and the way they felt about their appearance wherein the more children exercised the more their body dissatisfaction increased

(Duncan, Al-Nakeeb, Nevill, & Jones, 2006). Other studies have also found this association between higher exercise frequency and increased body dissatisfaction in young women (Tiggemann & Williamson, 2000), in adult women (Sonstroem, Harlow, & Josephs, 1994), and in adult men (Varnado-Sullivan, Horton, & Savoy, 2006). In addition, higher levels of commitment to exercise, a construct very similar to exercise dependence in its addressing the degree of rigid adherence to an exercise routine despite negative costs and consequences, has been linked to increased body dissatisfaction in female aerobics instructors (Martin & Hausenblas, 1998). In a study comparing regularly exercising females ($n = 53$) to non-exercising females ($n = 43$), regular exercisers with addictive personalities displayed greater drive for thinness, body dissatisfaction, symptoms of bulimia, and preoccupation with their weight and eating habits than regular exercisers who did not have addictive personalities and non-exercisers (Davis, 1990). This study provides additional support for the notion that people who exercise compulsively may be at an even greater risk for body dissatisfaction.

To complicate the picture even more, several studies examining the relationship between exercise and body satisfaction have not found any evidence of a significant connection between them. For instance, in physical education teachers who regularly engage in aerobic activities such as swimming, tennis, cycling, and running, no relation was found between their commitment to and frequency of exercise, and measures of drive for thinness, body satisfaction, and symptoms of bulimia (Pini, Calamari, Puleggio, & Pullerá, 2007). Obligatory exercisers also have been found to be no different than nonobligatory exercisers in attitudes towards body weight, and in body satisfaction, with neither group displaying negative feelings about their appearance (Brehm & Steffen,

1998). Obligatory exercise refers to compulsive exercise that is engaged in even when

health, jobs, and relationships are at stake (Yates, 1991), much like those classified as

exercise dependent or highly committed to exercise. Neither were males with symptoms

of obligatory exercise and male controls differentiated from each other on measures of

drive for thinness, bulimic symptoms, and body dissatisfaction, with both groups scoring

in the non-clinical range (Nudelman, Rosen, & Leitenberg, 1988). Other studies too,

have found no relationship between amount of exercise and body dissatisfaction (Russell,

2002), drive for thinness, or bulimic symptoms (Krane, Stiles-Shipley, Waldron, &

Michalenok, 2001).

Inconsistencies in self-esteem. As mentioned, similar inconsistencies have been

found with regards to the relationship between exercise and self-esteem. A meta-analysis

of the literature on exercise and self-esteem determined that exercise participation

consistently leads to a small increase in self-esteem, but only if improvements in physical

fitness are also experienced. This relationship was found at all levels of exercise

frequency (Spence, McGannon, & Poon, 2005).

Increased self-esteem as a result of exercise participation has not always been

found. Researchers (Groves, Biscomb, Nevill, & Matheson, 2008) examined the

connection between exercise dependence and self-esteem separately for students from

three different universities with different levels of athletic involvement. They discovered

that students from the university which placed the greatest importance on athletics

exhibited a consistent negative correlation over time between exercise dependence and

self-esteem, such that those who displayed the greatest levels of dependence had

significantly lower self-esteem. No such relationship was found for the other two

universities studied. Additionally, another study has suggested that the more young

women exercise the worse they feel about themselves (Tiggemann & Williamson, 2000).

Other research has not found a significant link between exercise and self-esteem.

For instance, a study comparing female college students who exercise regularly to those

that do not found no differences in self-esteem between the two groups, with all students

exhibiting moderate to high levels regardless of their degree of physical activity (Moore,

1993). Russell (2002) found similar results for male college students.

The Role Motivations Play in the Outcomes of Exercise

It therefore appears, that in the literature on the outcomes of exercise, in particular

exercise that is excessive or compulsive, there are times when body satisfaction and self-

esteem are improved (Chan & Grossman, 1988; Fisher & Thompson, 1994; Hausenblas

& Fallon, 2002; Hausenblas & Fallon, 2006; Spence, McGannon, & Poon, 2005), times

when they are significantly reduced (Davis, 1990; Duncan, Al-Nakeeb, Nevill, & Jones,

2006; Groves, Biscomb, Nevill, & Matheson, 2008; Sonstroem, Harlow, & Josephs,

1994; Sullivan, Horton, & Savoy, 2006; Tiggemann & Williamson, 2000; Varnado-

Martin & Hausenblas, 1998), and times when no relationship has been evident (Brehm &

Steffen, 1998; Krane, Stiles-Shipley, Waldron, & Michalenok, 2001; Moore, 1993;

Nudelman, Rosen, & Leitenberg, 1988; Pini, Calamari, Puleggio, & Pullerá, 2007;

Russell, 2002). Other researchers have explored these discrepancies (e.g., Groves,

Biscomb, Nevill, & Matheson, 2008; Hausenblas & Downs, 2002), employing a variety

of explanatory theories. A promising idea in the effort to explain these differences

involves the reasons why individuals engage in exercise. Some studies examining the

effects of physical activity have found a connection between the motivations people have

to engage in exercise, and the outcomes they experience (e.g., Furnham, Badmin, & Sneade, 2002). People exercise for a large number of different reasons including for enjoyment, for weight control, to improve body tone, for health, for fitness, to improve physical attractiveness, and to improve mood (Silberstein, Striegel-Moore, Timko, & Rodin, 1988). Research that has examined the various motivations individuals have for exercising, has frequently found a difference in the outcomes that are experienced, depending on whether the exercisers are motivated by the desire to control weight, improve appearance, and alter body shape or by other benefits such as improved health and fitness. Exercise motivations based on appearance and weight often lead to negative psychological outcomes, while exercise for reasons such as health and fitness tend to result in psychological benefits (e.g., Furnham, Badmin, & Sneade, 2002).

A study examining methods that women use to lose weight and prevent weight gain determined that women who exercised for the purposes of controlling weight and improving body shape ($n = 79$) displayed more body dissatisfaction than women who did not engage in exercise for these reasons ($n = 110$; LePage, Crowther, Harrington, & Engler, 2008). Further research examining women's ($N = 101$) motives for exercising found that exercise for the purposes of weight control and improving one's appearance was associated more strongly with exercise frequency and body dissatisfaction, than was exercise for reasons such as fitness, health, stress relief, mood management, and desire to socialize (Cash, Novy, & Grant, 1994). A follow-up to this study, using the same assessment of exercise motivation, discovered that the desire for health and fitness could also predict women's ($n = 100$) exercise frequency, but that it did not lead to increased body dissatisfaction. When the authors of this study looked separately at exercise for the

purposes of weight control, they found a significantly greater association with body dissatisfaction than among the other exercise motivations. Men in the study ($n = 78$) were more likely to exercise for reasons of health and fitness, but it did not lead to a difference in their level of body satisfaction (Smith, Handley, & Eldredge, 1998).

Another comparison of physically active men and women (McDonald & Thompson, 1992) determined exercise motivated by weight concern and desire to improve body shape and attractiveness, but not exercise to benefit mood and health, or for enjoyment, leads to significant decrements in body satisfaction and increased eating disturbance for both men and women. A negative relationship was also found between exercising for attractiveness and self-esteem in men. However, exercising to improve one's health was positively correlated with self-esteem for both genders, and exercising for fitness reasons was positively related to self-esteem as well, but only for men (McDonald & Thompson, 1992). Additionally, it has been found that exercise motivated by health and fitness improves self-esteem for both men and women, and that exercise motivated by weight concerns and desire to improve tone worsens body satisfaction for both men and women (Tiggemann & Williamson, 2000). Further, associations discovered between increased frequency of exercise and disordered eating and body dissatisfaction in females were determined to be mediated by appearance-based reasons for exercising, such as for weight control, and out of desire for improved tone and attractiveness. In addition, women who exercised for health and fitness were less likely to view their bodies as objects (Prichard & Tiggemann, 2008).

A comparison of young women who exercised to control their body weight or exercised for other reasons (not specified in the study; Hubbard, Gray, & Parker, 1998)

discovered that women who exercised out of weight concern exhibited greater body dissatisfaction, drive for thinness, disturbed eating, investment in their appearance, weight preoccupation, obligatory-type exercise behaviours, and lower self-esteem. Additionally, people of both genders who exercised to control weight, tone their bodies, or for attractiveness exhibited significantly greater body dissatisfaction than those who exercised for improved health, mood, fitness, and enjoyment. Self-esteem was also found to be lower in the men and women who exercised for weight control, and higher in the men who exercised for fitness and tone (Furnham, Badmin, & Sneade, 2002).

It seems quite clear then, that when examining individuals' motivations for engaging in exercise, there is a trend towards health and fitness motives leading to improved or at least unaffected body satisfaction and higher self-esteem, while motives to control weight, improve tone, and increase attractiveness result in body dissatisfaction and lower self-esteem. In order to understand these divergent effects on body satisfaction and self-esteem, it is proposed that the different types of motivations must be examined in conjunction with the trait of perfectionism.

Perfectionism

Perfectionism refers to the tendency some individuals have to set incredibly high standards for themselves and then rigidly hold to those standards, determining their self-worth according to their degree of success (Burns, 1980). Perfectionism has been found to contribute to such maladies as anxiety (Flett, Hewitt, & Dyck, 1989), depression and suicide (Burns, 1980), substance abuse and coronary disease (Pacht, 1984), and eating disorders (Cash & Szymanski, 1995). In addition, people who exhibit exercise dependence display high levels of perfectionism as well; for example, perfectionism has

been linked to obligatory exercise (Brehm & Steffen, 1998; Gulker, Laskis, & Kuba, 2001), greater degrees of commitment to exercise (Pini, Calamari, Puleggio, & Pullera, 2007), and addictive personality traits within a group of regular exercisers, but not within a group of non-exercisers (Davis, 1990).

Two types of perfectionism. An important distinction has been made in the construct of perfectionism, between a variety of perfectionism that is healthy and a type that is not. Adler (1956) described healthy perfectionists as those who pursued attainable goals, and unhealthy, or maladaptive perfectionists, as people who were driven to succeed out of a fear of making mistakes and being criticized. Hamachek (1978) distinguished between normal and neurotic perfectionists. Normal perfectionists have high expectations for themselves and get satisfaction and improved self-worth out of meeting the goals that they have set, but they are also able to accept personal imperfection. In contrast, neurotic perfectionists find the idea of personal imperfection unacceptable and are driven by a fear of failure towards unrealistic goals, rarely if ever feeling good about their accomplishments. Terry-Short et al. (1995) and Slade and Owens (1998) outlined the differences between positive perfectionists and negative perfectionists. The former pursue lofty goals and achievements because of the pleasure and satisfaction they get from succeeding. In terms of self-concept positive perfectionists are trying to get closer to the person they want to be. They further have a tendency to seek others' approval. Negative perfectionists also strive towards a high level of achievement, but they are motivated by a desire to avoid the negative consequences that might be associated with not succeeding. In terms of self-concept they are fleeing from the person they do not want to be. In contrast to the positive perfectionists, negative

perfectionists work to avoid disapproval. Healthy forms of perfectionism are referred to as normal, adaptive, or positive perfectionism, and unhealthy forms of perfectionism are referred to as neurotic, maladaptive, or negative perfectionism (see Hamachek, 1978; Rice & Preusser, 2002; Terry-Short et al., 1995).

It is proposed that people who exercise excessively for health and fitness will tend more towards positive perfectionism, but that people who exercise excessively in order to control their weight and improve their attractiveness and tone will tend to have high levels of both positive and negative perfectionism. This is because weight preoccupation often involves both a drive to become thinner and an avoidance of becoming fat (Gilbert, 2000). People who desire to be thinner may be motivated out of a desire for approval and the satisfaction that thinness will bring, while people who fear gaining weight may be motivated by the desire to avoid disapproval and the negative consequences associated with being overweight (Levitt, 2003). This distinction in motives is similar to the one between positive and negative perfectionists.

Exercise Motivations as Potential Mediators

Therefore it is proposed that the different reasons excessive and compulsive exercisers have for engaging in physical activity will mediate the relationship between exercise dependence and either positive or negative perfectionism. For instance, it makes sense that exercising for health and fitness would be related more to a drive for pleasure than the motivation to avoid something unpleasant. Good health and fitness are both highly associated with an enhanced quality of life (Lustyk, Widman, Paschane, & Olson, 2004), which is certainly pleasurable. And as just mentioned, exercising for reasons of

weight control can reasonably be expected to be related to either a motivation to attain

pleasure and approval, or a motivation to avoid negative consequences and disapproval.

The proposed mediations are partially supported by a study that compared female

athletes, women with eating disorders, people with depression, and controls (Terry-Short

et al., 1995). This study found that the athletes had high levels of positive perfectionism

and average levels of negative perfectionism, while the women with eating disorders had

high levels of both positive and negative perfectionism. Therefore, in this study frequent

exercise was indeed correlated more with positive perfectionism than with negative

perfectionism, but the participants who exercised frequently did not have their

motivations for doing so assessed. Additionally, women with a strong desire to control

their weight displayed both types of perfectionism, but they were not assessed for how

frequently they exercised.

In further support of the proposed mediations was a comparison of women based

on their differing reinforcement sensitivity (Mussap, 2007). Reinforcement sensitivity

refers to individual variations in the degree to which individuals are sensitive to

rewarding stimuli and threatening stimuli (Gray, 1973). There is a distinction in the

concept of reinforcement sensitivity that is conceptually similar to the different drives in

positive and negative perfectionism in that it distinguishes between sensitivity to rewards

and sensitivity to punishments. Sensitivity to rewards tends to promote the pursuit of

pleasure, and sensitivity to punishments tends to promote the avoidance of pain (Carver

& White, 1994). It was determined that obligatory exercise was equally related to

sensitivity to rewards and sensitivity to punishments, and weight concern was associated

with both types of reinforcement sensitivity, but more so with sensitivity to punishments

(Mussap). Additionally, in partial support of the currently proposed mediation between exercise dependence and perfectionism type, the study determined that relationships between obligatory exercise and both types of sensitivity were meditated by both the importance individuals ascribed to attaining their ideal body and by the importance individuals ascribed to avoiding the body they feared most (Mussap). If thought of in terms of weight concerns, similarities can easily be seen between the pursuit of the ideal body and a drive for thinness, and between avoidance of the most feared body, and a drive to avoid fatness. Other research has shown significant relationships between restrained eating and both excessive commitment to exercise and perfectionism (McLaren, Gauvin, & White, 2001), so although untested there could potentially be a mediation effect present between exercise commitment and perfectionism through eating restraint.

Positive and Negative Perfectionism as Potential Moderators

It is further proposed that the different types of perfectionism will moderate the association between exercise dependence and body satisfaction and self-esteem. Due to the aforementioned connection between exercise dependence and perfectionism (e.g., Brehm & Steffen, 1998), it is therefore expected that exercise dependence with high levels of positive perfectionism will be related to higher self-esteem and improved body satisfaction, and exercise dependence with high levels of negative perfectionism will be associated with lower self-esteem and increased body dissatisfaction.

Moderation of body satisfaction. In support of the proposed relationships between type of perfectionism and body satisfaction, research by Davis (1997) has determined that among women with eating disorders (a group known to have

considerable weight preoccupation) a higher level of normal, adaptive perfectionism, in conjunction with a low level of neurotic, maladaptive perfectionism was associated with increased body satisfaction. In contrast, when a high level of normal, adaptive perfectionism occurred alongside a high level of neurotic, maladaptive perfectionism it was associated with a decrease in body satisfaction (Davis, 1997). Further, on their own, unhealthy forms of perfectionism (i.e., neurotic, maladaptive, and negative) have been negatively associated with body satisfaction (Ashby, Kottman, & Schoen, 1998; Chan & Owens, 2006; Pearson & Gleaves, 2006). Additionally, it has been determined that among male and female athletes, high levels of negative perfectionism are associated with high levels of social physique anxiety (Haase, Prapavessis, & Owens, 2002), which refers to the anxiety people experience when they believe that others are negatively evaluating their appearance (Hart, Leary, & Rejeski, 1989). Certainly then, it appears that positive perfectionism, in the absence of the neurotic variety, is associated with body satisfaction, while negative perfectionism with or without the presence of positive perfectionism is connected to body dissatisfaction.

Theoretically, it makes sense that exercise dependence combined with positive perfectionism would lead to improved body satisfaction. Research has shown, that whether weight concerns are present or not, people who exercise excessively place a high degree of importance on the way they feel about their bodies (Davis & Fox, 1993). Since positive perfectionism is related to satisfaction when goals are attained (Slade & Owens, 1998), excessive exercisers who are motivated by the desire to improve their health and fitness will likely feel better about their bodies as they attain their health and fitness goals. And too, it makes theoretical sense that when exercise dependence is paired with

negative perfectionism, the result may be increased body dissatisfaction. Since negative

perfectionism is thought to be linked to the avoidance of something that is feared (Slade

& Owens, 1998), excessive exercisers who are motivated by a desire to not gain weight

may never be satisfied with the results of their exercise because gaining weight will

always remain a future possibility. Therefore they will likely retain their weight concerns

leading to continued dissatisfaction with their appearance due to the well supported

connection between weight concerns and body dissatisfaction (Cash & Hicks, 1990).

However, Slade (In Press, as cited in Slade & Owens, 1998) suggests that weight

preoccupied individuals who desire to be thin are more likely to exhibit positive

perfectionism than those who desire to avoid becoming fat. He further suggests that

weight preoccupied individuals with high levels of positive perfectionism may not show

the same psychological disturbance as those who are predominantly negatively

perfectionistic. If Slade is correct, positive perfectionists who exercise excessively in

order to be thin may feel satisfied with the slimming results of their exercise and as a

result show body satisfaction improvement.

Moderation of self-esteem. Past research has also supported the proposed link

between type of perfectionism and self-esteem. Many studies have shown that unhealthy

varieties of perfectionism (i.e., neurotic, maladaptive, negative) are connected to lower

self-esteem (Ashby & Rice, 2002; Ashby, Rice, & Martin, 2006; Pearson & Gleaves,

2006; Rice, Ashby, & Slaney, 1998; Stumpf & Parker, 2000; Trumpeter, Watson, &

O'Leary, 2006), while healthy varieties of perfectionism (i.e., normal, adaptive, positive)

are associated with improved self-esteem (Ashby & Rice, 2002; Pearson & Gleaves,

2006; Stumpf & Parker, 2000). Another study specifically examining athletes (Gotwals,

Dunn, & Wayment, 2003) found the same relationship between maladaptive

perfectionism and low self-esteem, but evidence of a connection between adaptive

perfectionism and high self-esteem was not found.

It makes further theoretical sense that exercise dependence combined with

positive perfectionism would lead to improved self-esteem and that excessive exercise

paired with negative perfectionism would lead to a self-esteem decrement. Research has

shown that perfectionists' self-worth is determined largely by their accomplishments

(Brown, 1980). Excessive exercisers who are positive perfectionists will likely feel better

about themselves when they see improvements in their health, fitness, or thinness. On

the other hand, excessive exercisers who are negative perfectionists will never attain their

goals if they are motivated by preventing weight gain. This is because weight gain will

always be a future possibility, and they may feel bad about themselves for failing to

achieve their goals, evinced by a drop in self-esteem. In support of this theory, research

has already shown a relationship between failure to achieve important goals and

diminished self-worth (Crocker & Wolfe, 2001).

Purpose and Hypotheses of the Present Research

Purpose

The purpose of the present study was to clarify the relationships between exercise

dependence and both body satisfaction and self-esteem. The foregoing evidence suggests

that the different motivations people have for engaging in excessive exercise

differentially affect the psychological outcomes of that exercise such as body satisfaction

and self-esteem. In addition, it has been shown that people who are exercise dependent

are highly perfectionistic. The research presented further supports the assertion that the

different motivations people have for engaging in excessive exercise may be related to

the type of perfectionist that they are, and that these perfectionism types could help to

explain the relationships between exercise dependence and the resulting impact on body

satisfaction and self-esteem.

It has previously been determined that women differ from men in their

motivations for engaging in physical activity, as well as in the way exercising affects

their body image and self-esteem (McDonald & Thompson, 1992; Smith, Handley, &

Eldredge, 1998; Tiggemann & Williamson, 2000). Therefore, for clarity of

interpretation, the present investigation solely examined female participants.

Hypotheses

Hypothesis 1. A desire to improve health and fitness through exercise is expected

to mediate the relationship between exercise dependence and positive perfectionism.

This hypothesis is based on a belief that women who exercise with improvements to their

health and fitness in mind, will likely also be the type of perfectionists that pursue their

goals because of the pleasure they feel when they attain them. This belief is in part due

to the finding that good health and fitness are associated with such pleasurable outcomes

as an enhanced quality of life (Lustyk, Widman, Paschane, & Olson, 2004).

Hypothesis 2. A desire to improve appearance and control weight through

exercise is expected to mediate the relationship between exercise dependence and

positive perfectionism.

Hypothesis 3. A desire to improve appearance and control weight through

exercise is expected to also mediate the relationship between exercise dependence and

negative perfectionism. These last two hypotheses are suggested in part by past research

that has found a mediated relationship between obligatory exercise and both reward sensitivity and punishment sensitivity (Mussap, 2007). In this study, the importance of achieving an ideal body, and the importance of avoiding a feared body served as mediators. As noted earlier, reward and punishment sensitivities are conceptually similar to positive and negative perfectionism (Carver & White, 1994).

Hypothesis 4. It is proposed that positive perfectionism, while controlling for negative perfectionism and body mass index (BMI), will moderate the association between exercise dependence and body satisfaction. It is expected that exercise dependence in conjunction with high levels of positive perfectionism will be related to better body satisfaction. Previous research has already found a relationship between a combination of high levels of positive perfectionism with low levels of negative perfectionism and better body satisfaction among women with eating disorders (Davis, 1997).

Hypothesis 5. Positive perfectionism, while controlling for negative perfectionism, is also expected to moderate the association between exercise dependence and self-esteem. Exercise dependence in combination with high levels of positive perfectionism should be related to higher self-esteem. Previous research has already shown a relationship between positive perfectionism and higher self-esteem (Ashby & Rice, 2002).

Hypothesis 6. In addition, it is proposed that negative perfectionism, while controlling for positive perfectionism and BMI, will moderate the association between exercise dependence and body satisfaction. It is expected that exercise dependence in conjunction with high levels of negative perfectionism will lead to increased body

dissatisfaction. A relationship between negative perfectionism and body dissatisfaction has already been determined (Ashby, Kottman, & Schoen, 1998; Chan & Owens, 2006; Pearson & Gleaves, 2006).

Hypothesis 7. Negative perfectionism, while controlling for positive perfectionism, is also expected to moderate the association between exercise dependence and self-esteem. Exercise dependence in combination with high levels of negative perfectionism should be related to lower self-esteem. Previous research has already shown an association between negative perfectionism and lower self-esteem (Ashby & Rice, 2002).

Each of the perfectionism types was assessed while holding the other constant in order to achieve clearer contrasts between the two (Trumpeter, Watson, & O'Leary, 2006). It is not expected that exercise dependence combined with lower levels of positive or negative perfectionism will display a meaningful pattern of effects on either body satisfaction or self-esteem, as perfectionism type is proposed to be key in clarifying the differing relationships between exercise dependence and its psychological outcomes. The reason for controlling for BMI is due to the well-documented finding that females with higher BMIs are more likely to be preoccupied with their weight (e.g., McCabe & Ricciardelli, 2003), and also are more prone to experience body dissatisfaction (Cash & Roy, 1999). Certainly then, differences in participants' BMIs could be differentially correlated with their degree of exercise preoccupation and their reasons for exercising, leading to confounding effects when assessing their body image.

Hypothesis 8. The proposed path model (see Figure 1) will provide a good fit for the data.

Chapter II

METHOD

Participants

Adult females were recruited through posted advertisements (Appendix A) in a local gym, and online (Appendix B) using websites such as Facebook, and forums catering to individuals interested in physical activity. Permission was given by individuals in charge of the sites before any advertisements were posted in the online forums, and in the gym (Appendix C). Participation was restricted to females 18 years of age and older, and to those currently living in either Canada or the United States. In return for their participation, individuals were offered the opportunity to enter a draw for one of four 50 dollar gift certificates from Amazon.ca or Amazon.com. Five cases were removed from analyses due to duplication, and 13 more as a result of missing all data on 5 or more of the 7 variables. One last case was removed from analyses due to having an extreme score that could not be corrected. The resulting sample was made up of 99 females (*M* age = 29.90, *SD* = 7.58 years). Most of the participants had 16 or more years of education (70%), and a large number reported being full-time students (43%). The majority of the sample were employed full-time (54%), followed by those with part-time employment (25%), and the unemployed (20%). In regards to ethnicity, the sample was primarily Caucasian (80%), followed by those identifying as European (5%), Other (5%), East Asian (4%), South Asian (2%), of African descent (2%), and Hispanic (2%). Sixty percent of the sample resided in Canada and 40 percent in the U.S.. On average, participants reported exercising for 5.04 hours per week (*SD* = 3.92). The average score

on the body mass index was 24.20 ($SD = 4.60$), and this corresponds to a normal body weight.

Measures

   Exercise Dependence Questionnaire (EDQ). The Exercise Dependence Questionnaire (Ogden, Veale, & Summers, 1997; Appendix D) assesses participants' dependence on exercise. The EDQ is a 29-item self-report measure comprised of eight subscales measuring exercise for social reasons, positive reward, stereotyped behaviour, withdrawal symptoms, exercise for weight control, interference with social, family, or work life, insight into problem, and exercise for health reasons. Some sample items are "I exercise to feel fit," "My level of exercising makes me tired at work," and "If I cannot exercise I feel irritable." Participants' responses are made on a 7-point Likert-type scale ranging from 1 ("Strongly Disagree") to 7 ("Strongly Agree"), and thus higher scores signify greater dependence. Ogden et al. (1997) did not provide a cutoff point for determining dependent versus non-dependent exercisers. They reported that the EDQ can be used as a continuous measure, and this was done in the present study. Previous research (Bamber, Cockerill, & Carroll, 2000) has employed a cutoff point of 116, which represents an average response of 4 on the 7-point scale for all of the 29 items. The EDQ additionally contains questions asking participants for their age, sex, height, weight, and how many hours per week they exercise (Ogden, Veale, & Summers).

   Reported internal consistency for the EDQ is adequate, with Cronbach's alphas ranging from 0.70 to 0.81 for 7 of the 8 subscales, and 0.52 for the Stereotyped behaviour subscale, and a Cronbach's alpha of 0.84 for the entire questionnaire (Ogden, Veale, & Summers, 1997).

Eating disorder assessments are sometimes paired with the EDQ in order to distinguish exercise dependent individuals who may have eating disorders in order to exclude them from analyses (e.g., Blaydon, Lindner, & Kerr, 2004). However, since individuals with eating disorders exercise compulsively out of a desire to be thinner or to not put on weight (Anderson & Bulik, 2004), they fall into the category of compulsive exercisers motivated by weight preoccupation that the present investigation desired to study. Therefore, exercise dependent individuals with eating disorders were not to be excluded, so no eating disorder assessment was used to distinguish them from other exercise dependent participants.

Reasons for Exercise Inventory (REI). The Reasons for Exercise Inventory (Silberstein et al., 1988; Appendix E), a 24-item self-report measure, assesses the different motivations participants have for engaging in exercise. The extent to which the items reflect participants' personal reasons for exercising is indicated on a 7-point Likert-type scale ranging from 1 ("Not at all important") to 7 ("Extremely important"), and thus higher scores indicate that the items (e.g., "I exercise to improve my overall health") reflect a more important reason for why the participant exercises. The original REI has seven subscales covering different motivations for exercising including exercising for overall appearance, improved mood, health, fitness, tone, enjoyment, and weight control. The seven subscales have adequate internal consistency, with Cronbach's alphas ranging from 0.67 to 0.81 (Silberstein et al., 1988).

Cash, Novy, and Grant (1994) factor analyzed the original REI scale and obtained four factors: Stress/Mood Management, Fitness/Health Management, Appearance/Weight Management, and Socializing. The items for each of the factors are summed, and the

means are derived to determine a separate score for each factor. The four factors produced Cronbach's alphas ranging from 0.73 to 0.91, exhibiting good internal consistency. Cash et al. (1994) added in the item "I exercise to do what is socially expected" to reflect exercising engaged in out of a desire to fulfill societal expectations, and removed the items "I exercise to improve my muscle tone" and "I exercise to maintain my current weight" due to their failure to load sufficiently on a specific factor, resulting in a 23-item scale. The item pertaining to muscle tone had been part of the fitness motives subscale on the original measure (Silberstein et al., 1988), but certainly might be reflecting appearance and tone motives as well, which could explain why it did not load highly enough on any single factor. The item pertaining to weight maintenance was reportedly chosen to reflect the domain of weight control, but may not have been worded specifically enough for what it appears the authors might have intended. This may have led to the item not loading sufficiently on the Appearance/Weight Management factor. As previously mentioned, when individuals are preoccupied with their weight it is out of a desire to be thinner as well as *a desire to avoid becoming fat* (Gilbert, 2000). It appears that the avoidance of weight gain may have been what Silberstein et al. (1988) meant to capture with their item "I exercise to maintain my current weight," and therefore in the present study this item was replaced with "I exercise to prevent weight gain" rather than simply removing it. Therefore, the present study employed the four factor scale developed by Cash et al. (1994), but included the additional item for a total of 24 items.

Positive and Negative Perfectionism Scale (PANPS). The Positive and Negative Perfectionism Scale (Terry-Short et al., 1995; Appendix F), a 40-item self-report measure, assesses participants' levels of positive and negative perfectionism. The scale

contains 20 items reflecting positive perfectionism and 20 items reflecting negative

perfectionism. Responses to items are made on a 5-point Likert-type scale ranging from

1 ("Strongly Disagree") to 5 ("Strongly Agree") with higher scores indicating the extent

to which participants are driven by either the pursuit of something pleasurable (e.g.,

"Producing a perfect performance is a reward in its own right") or the avoidance of

something unpleasant (e.g., "I try to avoid the disapproval of others at all costs"). Scores

for both positive and negative perfectionism range from 20 to 100 (Terry-Short et al.,

1995).

Cronbach's alphas of 0.83, 0.83, and 0.85 for positive perfectionism and 0.81,

0.88, and 0.85 for negative perfectionism have been reported (Chan & Owens, 2006;

Haase & Prapavessis, 2004; Haase, Prapavessis, & Owens, 1999), indicating good

internal consistency. Construct validity has been demonstrated by a positive correlation

between disordered eating attitudes measured by the Eating Attitude Test (EAT-40;

Garner & Garfinkel, 1979) and negative perfectionism and a non-significant correlation

with positive perfectionism (Haase et al., 1999). Additionally, Terry-Short et al. (1995)

determined that individuals with eating disorders score high on negative perfectionism

and low on positive perfectionism, and athletes display the opposite pattern.

Body-Image States Scale (BISS). The Body-Image States Scale (Cash, Fleming,

Alindogan, Steadman, & Whitehead, 2002; Appendix G) assesses participants' degree of

body image satisfaction. It has 6 items and is completed by self-report. Participants are

instructed to make their responses according to how they feel at the moment they are

filling out the measure. Responses are made by completing sentences with options

forming a 9-point Likert-type scale. Item one for example, asks participants to complete

the sentence "Right now I feel…" with options ranging from "Extremely dissatisfied with my physical appearance" (score = 1) to "Extremely satisfied with my physical appearance" (score = 9). Two of the items' answer choices range from positive to negative (e.g., 'extremely satisfied' to 'extremely dissatisfied') and the other 4 range in the opposite direction, from negative to positive. Reverse scoring is used on the former type in calculating an overall score for the BISS, and thus high scores relate to higher levels of body-image satisfaction (Cash, Fleming, Alindogan, Steadman, & Whitehead).

Internal consistency for the BISS is acceptable, with Cronbach's alphas ranging from 0.62 to 0.84 for men, and from 0.77 to 0.90 for women. At a two- to three-week follow up, test-retest reliability was good with correlations of 0.68 and 0.69 for men and women, respectively. Convergent validity has been established as well, as the BISS has been found to significantly correlate negatively with measures of body-image investment, such as the Appearance Schemas Inventory ($r = $-0.35 and -0.25 at time 1 and time 2 for men, and -0.41 and -0.28 at time 1 and time 2 for women), and the MBSRQs Body Areas Satisfaction Subscale (BASS; $r = $0.65 and 0.62 at time 1 and time 2 for men, and 0.78 and 0.77 at time 1 and time 2 for women), and also exhibits a negative correlation with BMI ($r = $-0.34 and -0.32 at time 1 and time 2 for men, and -0.53 and -0.46 at time 1 and time 2 for women; Cash et al., 2002). High scores on both the BISS and the MBSRQs BASS represent better body satisfaction, which is why a positive correlation represents convergent validity. Additionally, a high BMI is commonly associated with body dissatisfaction (Cash & Roy, 1999), which is why a negative correlation with the BISS can also signify convergent validity.

Rosenberg Self-Esteem Scale (RSES). The Rosenberg Self-Esteem Scale

(Rosenberg, 1965; Appendix H) assesses participants' levels of global self-esteem. It is a

10-item self-report measure with participant responses indicated on a 4-point Likert-type

scale. Responses range from 1 ("Strongly Disagree") to 4 ("Strongly Agree") with the

sum of responses identifying the participants total score. Half of the items are positively-

worded (e.g., "On the whole, I am satisfied with myself") and half of the items are

negatively-worded (e.g., "At times I think I am no good at all"); the negatively-worded

items are reverse scored. Total scores range from a minimum of 10 to a maximum of 40

with higher scores representing higher self-esteem. Scores of 30 or more may be

considered to represent moderately high self-esteem (Gibbs & Hines, 1992).

The RSES has been determined to have high internal consistency (Cronbach's

alpha = 0.92; Rosenberg, 1979), and good test-retest reliability (r = 0.85 after two weeks;

Silber & Tippett, 1965). Further, good convergent validity has been determined through

comparisons to other self-esteem measures such as the Coopersmith Self-Esteem

Inventory (Coopersmith, 1967) with samples of college students (r = 0.60; Crandall,

1973), and with interviewers' ratings of self-esteem (r = 0.56; Silber & Tippett, 1965).

Body Mass Index (BMI). Body Mass Index was also calculated from the height

and weight measurements collected by the EDQ in order to control for its potentially

confounding effects during the analyses of the hypothesized moderations involving body

satisfaction. BMI was calculated with either of the two following formulas: weight (in

kilograms) divided by height (in metres) squared, *or* weight (in pounds) divided by height

(in inches squared) and then multiplied by 703.

Procedure

The entire survey was completed online, by all participants. Prior to completing the measures, participants were presented with a consent form (Appendix I), which indicated that the study's purpose was to better understand the relationship between exercise frequency and personality in women, informed them of the rules for being entered in the draw, and assured them of confidentiality. The participants then filled out a questionnaire requesting demographic information (Appendix J), such as age and ethnicity. Following this, participants completed the measures, in random order, which took around 20 minutes.

After completing the measures, participants who completed at least 90% of the survey were asked to provide a valid email address if they wished to be entered into the draw for gift certificates. Participants who completed less than 90% of the survey were notified that if they wanted to still be considered in the draw for gift certificates they needed to send the researcher an email with the subject line "I wish to be entered in the draw;" this provided the researcher with valid email addresses for those participants. All of the email addresses were stored separately from the information provided during the survey, in order to preserve confidentiality. The email addresses were used to randomly select four participants to receive the gift certificates.

<div align="center">RESULTS</div>

Assessment of Missing Data, Outliers, and Assumptions

A visual inspection of the data revealed that 5 of the cases were clearly uncompleted attempts by participants who later completed the measures with a different case number. Based on the records of when the cases were created, and exactly matching

demographics, it was clear that these participants had begun the survey, exited for some

reason, then began the survey again several minutes later with a different case number,

rather than using their passwords to log back in under the original case number.

Therefore, the incomplete cases were filtered out of the analyses. Further inspection of

the data uncovered 12 cases where the participants had answered no questions at all on

six or seven of the seven measures, and one case where five of the seven measures had no

data. These 13 cases were considered to be missing too much data for further inclusion

in the analyses, and were also filtered out.

For the remaining 100 cases, any missing data points were analyzed to determine

if they were missing completely at random, missing at random, or missing not at random.

The results of these analyses suggested that the missing data points were a mix of missing

completely at random, missing at random, and missing not at random. An expectation

maximization (EM) algorithm was used to estimate the remaining missing values, so that

the variables with missing data points could still be included in all relevant analyses. EM

is the recommended procedure for producing unbiased estimates of missing data points

(Acock, 1997). The following analyses were run using the variables with imputed values,

and then all analyses were run again to ensure that the results were the same. This is

recommended when using imputed values for a small data set, and when any data are

missing in a non-random pattern (Tabachnick & Fidell, 2006).

Prior to analyses, the data were also screened for outliers and influential statistics.

For the predictor variables, no values fell outside of the range that would be expected for

a normally distributed sample this size. One case was found to have a very extreme

standardized residual value ($z = -4.626$) for the dependent variable measuring self-

esteem. A number of transformation techniques were employed to try and bring the outlier within a normal range, but they were unsuccessful. Due to the sensitivity of regression analyses to such extreme outliers (Stevens, 2002), the decision was made to filter it out of further analyses. There were no influential statistics discovered.

All analyses involved regressions, and therefore the assumptions of the regression model were assessed.

Appropriate n/k ratio. In order to reliably predict the dependent variable, a regression model requires that there be a sufficient number of cases for each predictor involved in each analysis. Stevens (2007) suggests that generally around 15 cases per predictor will provide adequate power in a regression analysis. The largest number of predictors that will be involved in any of the present study's regression analyses (not including the path analysis) is 5. Therefore, a sample size of 75 cases is acceptable; the present study meets that requirement ($N = 99$).

Absence of outliers and influential observations. Outliers and influential observations can have a substantial effect on how well a regression equation appears to predict the dependent variables (Stevens, 2002). The only case with a value considered excessively beyond what would have been expected in a normally distributed sample of this size was removed from further analysis, as previously noted.

Normal distribution. Normally distributed predictor and outcome variables are not assumed by regression analyses, and normality of the predictor variables may even be detrimental in terms of power (McClelland & Judd, 1993). What *is* important is that the residuals in the regression analyses are normally distributed, and in the present study they were. Therefore this assumption was met.

The absence of multicollinearity and singularity. If any of the predictors are too highly correlated, it becomes very difficult to assess the predictors' relative importance. The correlation matrix in Table 1 reveals that even the highest correlation between any two predictors ($r = -.630$) fell short of creating a situation of multicollinearity. This was confirmed with an examination of variance inflation factor and tolerance values.

Independence of errors. It is very important for the regression model that participants' responses be independent from those of other participants. Scatter plots between the standardized predicted values and the standardized residual values revealed that the errors were in fact independent. The Durbin-Watson statistics were also within the desired range, which confirmed that this assumption was met.

Linearity. The regression model also requires that there be linear relationships between the independent variables and the dependent variables. The aforementioned scatter plots also confirmed that the relationships between the independent variables and the dependent variables were linear. Normal probability plots provided further evidence of this.

Homoscedasticity. This assumption requires that the error variance be the same across all levels of the predictors. Once again the scatter plots between the standardized predicted values and the standardized residual values were used; they revealed that the residual values were in fact scattered randomly across the entire range of the predicted values.

Continuous data. The scale of the observed variables must be continuous. There is some debate over whether Likert-type scaled data can be appropriately used as continuously scaled data, however, many still consider it acceptable (e.g., Byrne, 1998).

Path analysis involves some additional assumptions.

The sample size is adequate. It is recommended that there be 10 cases per parameter, to test significance with path analysis (Kline, 1998). Unfortunately, the proposed model included 18 parameters, with only 99 cases. Therefore, this assumption was violated, and the results of the path analysis must be interpreted cautiously.

No under-identification. An under-identified model attempts to estimate more parameters than there are data points. The proposed model is over-identified, which is required for parameter estimation (Byrne, 1998).

Proper specification. It is important that the model includes all of the necessary causal variables. The literature review was used to inform the decision of which variables to include in the proposed model, and which to leave out.

Additivity. This assumption requires that there not be any interaction effects in the model. This assumption was met.

The error terms must be uncorrelated with the variables and with each other. The results of the path analysis suggested that two of the error terms be allowed to correlate. If correlated error is present and specified in the model, it may be estimated (Garson, 2009). Therefore, the correlation between the error terms was specified in a revised model, and presented no further problem.

Multivariate normality. A significantly elevated multivariate kurtosis value suggested that this assumption had been violated. In such situations, it is recommended that bootstrapping be used (Garson, 2009).

Scale Psychometrics

All of the measures used in the study were evaluated for internal consistency (Cronbach's α). Table 2 presents the results of these reliability analyses, along with the means and standard deviations for each of the scales. Only the subscales assessing exercise for reasons of socializing, and for stress and mood management fell below a level classified as good (i.e., ≥ .8; George & Mallery, 2003), however neither of these subscales were used in any analyses. All of the variables of interest had internal consistency statistics classified as good or excellent.

Primary Analyses

The alpha level was set at .05 for all statistical tests.

Hypothesis 1. To test the hypothesis that health and fitness motivation would mediate the association between exercise dependence and positive perfectionism, a series of four regression analyses was conducted. This four-step procedure was outlined by Baron and Kenny (1986) for estimating mediational effects. The first step of the Baron and Kenny procedure tests the correlation between the predictor and the outcome variable; the second step tests the correlation between the predictor and the mediator. Next, the effect of the mediator on the outcome variable is evaluated. The final step estimates the relationship between the predictor and the outcome variable, when the mediator is controlled for. To show full mediation, the first three regression analyses must be significant, and the fourth should not be. If the first three steps are met, but not the fourth, a partial mediation effect is present.

As shown in Table 3, the results of the regression analyses suggested that a mediation effect was not present. Exercise dependence significantly predicted both

health and fitness motivation and positive perfectionism, but health and fitness

motivation did not significantly predict positive perfectionism, and therefore provided no

mediation. These results support the conclusion that the relationship between exercise

dependence and positive perfectionism is not due to the motivation to improve health and

fitness through exercise.

Hypothesis 2. To test the hypothesis that appearance and weight motivations

would mediate the relationship between exercise dependence and positive perfectionism,

the series of four regression analyses was repeated again. As Table 4 summarizes, a

partial mediation effect was present. Further, as suggested by Baron and Kenny, the

Sobel test (Sobel, 1982) and bootstrapping technique (Shrout & Bolger, 2002) were used

to test the significance of the mediation. The Sobel test determined that the partial

mediation effect was significant, $z = 2.21$, $p < .05$, $CI_{.95} = .006, .097$, and this was

confirmed by bootstrapping $CI_{.95} = .009, .113$. Therefore, there was a 95% chance that

the population mean fell between .006 and .097 according to the confidence intervals

derived from the Sobel test, and between .009 and .113 according to the confidence

intervals derived from bootstrapping. Because the confidence intervals did not contain

zero, the partial mediation effect was confirmed as significant with 95% confidence.

Exercise dependence, mediated by appearance and weight motivations, accounted for 8%

of the variance in positive perfectionism. These results support the conclusion that the

relationship between exercise dependence and positive perfectionism is partially due to

the motivation to improve appearance and control weight through exercise.

Hypothesis 3. The hypothesis that appearance and weight motivations would also

mediate the association between exercise dependence and negative perfectionism was

tested with the same procedure. Table 5 shows that a full mediation effect was present.

Once again, the Sobel test was employed and found that the full mediation effect was

significant, $z = 2.25$, $p < .05$, $CI_{.95} = .010, .141$, and this was confirmed by bootstrapping

$CI_{.95} = .015, .160$. Therefore, there was a 95% chance that the population mean fell

between .010 and .141 according to the confidence intervals derived from the Sobel test,

and between .015 and .160 according to the confidence intervals derived from

bootstrapping. Because the confidence intervals did not contain zero, the full mediation

effect was confirmed as significant with 95% confidence. Exercise dependence,

mediated by appearance and weight motivations, accounted for 4% of the variance in

negative perfectionism. These results support the conclusion that the relationship

between exercise dependence and negative perfectionism is due to the motivation to

improve appearance and control weight through exercise.

Hypothesis 4. The hypothesis that positive perfectionism would moderate the

association between exercise dependence and body satisfaction was tested with a

hierarchical regression analysis. Body mass index (BMI) and negative perfectionism

were entered into the regression equation in step 1 to control for their effects. Positive

perfectionism and exercise dependence, both centered, were entered in step 2, and the

interaction term for positive perfectionism and exercise dependence was added in step 3.

The interaction term was the product of the centered positive perfectionism and exercise

dependence variables. Table 6 shows that positive perfectionism significantly predicted

body satisfaction, in the positive direction, but surprisingly exercise dependence did not

significantly predict it. The interaction term of positive perfectionism and exercise

dependence was a marginally significant predictor, *p = .053, CI$_{.95}$ = .001, .015,* in the

positive direction. The confidence interval indicated that there was a 95% chance that the population mean fell between .001 and .015. Because the confidence interval did not contain zero, the interaction term was confirmed as a significant predictor of body satisfaction, with 95% confidence. The effect of adding the interaction term to the regression equation was roughly small-sized (f^2 = .04), using Cohen's (1988) convention of small, medium, and large effects (f^2 = .02, .15, and .35, respectively). The present study's sample size is not sufficient for properly assessing the significance of such a small effect (Cohen, 1992). The regression equation accounted for 50% of the variance in body satisfaction. The adjusted R^2, as computed by the Stein formula (Stein, 1960), indicated that the regression equation would likely predict 44% of the variance in body satisfaction, when applied to another sample. The results of this hierarchical regression analysis support the conclusion that average and high levels of exercise dependence in combination with a high degree of positive perfectionism are moderately related to greater body satisfaction. In addition, it appears from the graph of the interaction (see Figure 2), that low levels of exercise dependence in conjunction with a low degree of positive perfectionism also predict greater body satisfaction.

Hypothesis 5. Another hierarchical regression analysis tested the hypothesis that positive perfectionism would moderate the association between exercise dependence and self-esteem. Negative perfectionism was entered into the regression equation in step 1, to control for its effects. Positive perfectionism and exercise dependence, both centered, were entered in step 2, and the interaction term for positive perfectionism and exercise dependence was added in step 3. Table 7 shows that positive perfectionism significantly predicted self-esteem, in the positive direction, but exercise dependence did not

significantly predict it. The contribution of the interaction term of positive perfectionism and exercise dependence was nonsignificant, $CI_{.95}$ = -.003, .005. The confidence interval indicated that there was a 95% chance that the population mean fell between -.003 and .005. Because the confidence interval contained zero, the interaction term was confirmed as a nonsignificant predictor of self-esteem, with 95% confidence. The regression equation accounted for 39% of the variance in self-esteem. The adjusted R^2 indicated that the regression equation would be expected to predict 33% of the variance in self-esteem, when applied to another sample. The results of this hierarchical regression analysis support the conclusion that exercise dependence, combined with positive perfectionism, is not related to better self-esteem. However, positive perfectionism alone, does predict better self-esteem.

Hypothesis 6. To test the hypothesis that negative perfectionism would moderate the association between exercise dependence and body satisfaction a third hierarchical regression analysis was conducted. BMI and positive perfectionism were entered into the regression equation in step 1 to control for their effects. Negative perfectionism and exercise dependence, both centered, were entered in step 2, and the interaction term for negative perfectionism and exercise dependence was added in step 3. The interaction term was the product of the centered negative perfectionism and exercise dependence variables. Table 8 shows that negative perfectionism significantly predicted body satisfaction, in the negative direction, but exercise dependence did not significantly predict it. The impact of the interaction term of negative perfectionism and exercise dependence was nonsignificant, $CI_{.95}$ = -.006, .007. The confidence interval indicated that there was a 95% chance that the population mean fell between -.006 and .007.

Because the confidence interval contained zero, the interaction term was confirmed as a nonsignificant predictor of body satisfaction, with 95% confidence. The regression equation accounted for 48% of the variance in body satisfaction. The adjusted R^2 indicated that the regression equation would likely predict 42% of the variance in the body satisfaction of another sample. The results of this hierarchical regression analysis support the conclusion that the interaction of exercise dependence and negative perfectionism is not related to lower body satisfaction. However, negative perfectionism independently serves as a predictor of lower body satisfaction.

Hypothesis 7. A final hierarchical regression analysis tested the hypothesis that negative perfectionism would moderate the association between exercise dependence and self-esteem. Positive perfectionism was entered into the regression equation in step 1, to control for its effects. Negative perfectionism and exercise dependence, both centered, were entered in step 2, and the interaction of negative perfectionism and exercise dependence was added in step 3. Table 9 shows that negative perfectionism significantly predicted self-esteem, in the negative direction, but once more, exercise dependence did not have a significant effect. The contribution of the interaction term of negative perfectionism and exercise dependence was nonsignificant, $CI_{.95} = -.003, .004$. The confidence interval indicated that there was a 95% chance that the population mean fell between -.003 and .004. Because the confidence interval contained zero, the interaction term was confirmed as a nonsignificant predictor of self-esteem, with 95% confidence. The regression equation accounted for 39% of the variance in self-esteem. The adjusted R^2 indicated that the regression equation would be expected to predict 33% of the variance in self-esteem, when applied to another sample. The results of this hierarchical

regression analysis support the conclusion that exercise dependence in combination with negative perfectionism is not related to worsened self-esteem. However, negative perfectionism alone, does predict lower self-esteem.

   Hypothesis 8. To test the hypothesized model (Figure 1), path analysis was used. A good fit between the model and the sample data is assessed with a number of different fit criteria. A good fit is displayed when the chi-square statistic (i.e., χ^2) is *not* significant (Joreskog & Sorbom, 1993), the nonnormed fit index (NFI) and the comparative fit index (CFI) are both .95 or above (Hu & Bentler, 1999), and the-root mean-square error of approximation (RMSEA) is .05 or less for good fit, and up to .08 for adequate fit (Browne & Cudeck, 1993). The model as proposed provided a poor fit for the data, χ^2(10, $N = 99$) = 45.165, $p = < .05$, CFI = .787, NFI = .757, RMSEA = .189. It was checked again with Bollen-Stine bootstrapping (Bollen & Stine, 1992), which is recommended when there is multivariate non-normality in the data, and the poor fit was confirmed, $p <$ .05 (Note: for good fit it should *not* be significant). Therefore, the model needed to be re-specified.

   Several alterations were made following recommendations for model respecification (Kline, 2005). Two paths were seen to have a nonsignificant effect within the model. The direct path from health and fitness motivations to positive perfectionism was nonsignificant, as was the direct path from exercise dependence to negative perfectionism. The nonsignificant path from health and fitness motivations to positive perfectionism confirms a finding from the mediation analysis used to test the first hypothesis; namely, that exercise motivated by a desire to improve health and fitness does not contribute meaningfully to positive perfectionism (see Table 3). Speculations

for this finding will follow in the discussion. The reason for the nonsignificant path from exercise dependence to negative perfectionism can be ascertained from the mediation analysis performed to test the third hypothesis. This analysis showed that the path between exercise dependence and negative perfectionism was fully mediated by appearance and weight motivations to exercise (see Table 5). Therefore, it stands to reason that this direct path would also not be significant in the path model, since appearance and weight motivations again serve as a mediator. In order to improve the model, both of these nonsignificant paths were removed. Four other sensible alterations were suggested by the modification indices. The first alteration was to add a direct path from body satisfaction to self-esteem, which is justified, since an association between body satisfaction and self-esteem is a common finding (e.g., Frost & McKelvie, 2004). The second and third alterations were to create direct paths between both exercise motivators and body satisfaction. Similar associations have been found in previous research (Cash, Novy, & Grant, 1994; Furnham, Badmin, & Sneade, 2002; Hubbard, Gray, & Parker, 1998; LePage, Crowther, Harrington, & Engler, 2008; McDonald & Thompson, 1992; Prichard & Tiggemann, 2008; Smith, Handley, & Eldredge, 1998; Tiggemann & Williamson, 2000). The fourth alteration was to allow the error terms for positive and negative perfectionism to correlate. Both of these types of perfectionism are assessed by the same measure, and it is certainly plausible that this may have led to error variance covariation between the two subscales. Based on reasoning which will be further discussed in the discussion section, these modifications were made as well.

The altered model (with 20 parameters) was then tested, and resulted in a good fit of the sample data $\chi^2(8, N = 99) = 9.969$, $p = > .05$, CFI $= .988$, NFI $= .946$, RMSEA $=$

.050. Again, due to multivariate non-normality, it was double checked with Bollen-Stine bootstrapping, and confirmed as good fitting, $p > .05$. Figure 3 shows the final model with standardized parameter estimates.

Tables 10 and 11 display the relative predictive strengths of each of the predictors on each of the outcome variables, while controlling for all of the other predictors. Table 10 shows that the strongest individual predictors of body satisfaction were appearance and weight control motivations to exercise, positive perfectionism, body mass index, and hours of exercise per week. Table 11 shows that the strongest individual predictors of self-esteem were positive and negative perfectionism.

After testing all of the hypotheses, the analyses were repeated without the imputed values. Two differences emerged. First, the mediation analysis between exercise dependence and positive perfectionism, with appearance and weight control motives serving as a mediator, resulted in a full mediation effect, where before it had only been partial mediation. The second difference was in regards to the moderately significant interaction between exercise dependence and positive perfectionism, in the prediction of body satisfaction. It was no longer even moderately significant. However, this hierarchical regression analysis was conducted with a sample of only 80, in comparison to a sample of 99 with imputed values. This drop in sample size was due to using pairwise deletion methods to conduct the analysis. As previously noted, the effect size of the moderately significant interaction was very small, so the drop in sample size may account for the absence of even moderate significance. Other than these two changes, the results were the same as with the imputed values, thereby confirming the findings.

DISCUSSION

Main Findings

The present study sought to bring clarity to the inconsistent relationships between exercise dependence and body satisfaction and self-esteem. A number of hypotheses were tested, with some success, but the theories may need refinement.

The role of motivations to exercise. It was proposed that the relationship between exercise dependence and positive perfectionism would be due to individuals' desire to improve their health and fitness through exercise. In other words, it was thought that women who exercised for these reasons would be more likely to pursue high personal standards for pleasure and satisfaction, rather than out of an aversion to something unpleasant. The findings did not support this hypothesis. Exercise dependence was significantly related both to health and fitness motivation and to positive perfectionism, but health and fitness motivation was not related significantly to positive perfectionism. This result was difficult to explain. Certainly improved health and fitness would be pleasurable, so why would individuals pursue these goals if not for the satisfaction and enjoyment of becoming more fit? It did not seem more likely that the women in the study exercised out of a fear of poor health and unfitness, rather than focusing on the reward improvements would bring. For instance, there was also no significant relationship found between health and fitness motivation to exercise and negative perfectionism. It simply appeared that the women who exercised for these reasons were not perfectionistic.

It was also proposed that the relationships between exercise dependence and both positive and negative perfectionism would be due to individuals exercising for the

purpose of improving their appearance and controlling their weight. In other words,

women who are motivated to exercise by their appearance concerns and to either lose

weight or prevent weight gain were thought to be of two types. One type would exercise

in the pursuit of feeling better about the way they look, and the rewards that come with

being beautiful in our society. The other type would exercise out of a fear of the negative

social consequences and stigma associated with being considered unattractive. Both

types would have high personal standards. The evidence supported these hypotheses.

The relationship between exercise dependence and positive perfectionism was partially

mediated by these reasons for exercising (or fully mediated, when imputed values were

not used), and the relationship between exercise dependence and negative perfectionism

was fully mediated by them. This corresponded to other researchers' suggestions that

people with weight concerns either want to lose weight for the pleasure thinness will

bring, or want to avoid becoming overweight out of a fear of the unpleasant associated

consequences (Gilbert, 2000; Levitt, 2003). Oddly enough, however, women's

appearance and weight control motivations for exercising were not significantly related to

their body mass. It could be that women across a range of BMIs are equally likely to

exercise for the purpose of weight control. This may at first seem counterintuitive, and

that women with higher BMIs would be more likely to exercise for these reasons. One

possible explanation is that the fear of the stigma attached to being overweight has been

linked to the avoidance of exercise (Vartanian & Shaprow, 2008). More likely however,

is that the nonsignificant relationship between BMI and exercising for weight control is

because of how common the experience of weight dissatisfaction is among women in

general (Rodin, Silberstein, & Striegel-Moore, 1984). Therefore women of all body weights may be equally likely to exercise with weight control motives in mind.

  The role of perfectionism type. It was further hypothesized that the impact of exercise dependence on body satisfaction and self-esteem would be due to the type of perfectionism that the exercisers displayed. Specifically, it was thought that a combination of exercise dependence and positive perfectionism would lead to improvements in body satisfaction and self-esteem, and a combination of exercise dependence and negative perfectionism would lead to decrements in both. The present study's findings only partially supported such conclusions. The interaction between exercise dependence and the perfectionism types did not have the strong predictive effect on body satisfaction and self-esteem that was expected. This was likely due to the lack of a significant relationship between exercise dependence and both of the outcome variables. This was a surprising outcome of the study, and might at first seem to contradict studies cited earlier that found significant relationships between exercise and body satisfaction (Davis, 1990; Duncan, Al-Nakeeb, Nevill, & Jones, 2006; Hausenblas & Fallon, 2006; Martin & Hausenblas, 1998; Sonstroem, Harlow, & Josephs, 1994) and self-esteem (Groves, Biscomb, Nevill, & Matheson, 2008; Spence, McGannon, & Poon, 2005; Tiggemann & Williamson, 2000). However, it is important to note that many of these studies found significant links between body satisfaction, self-esteem, and exercise *in general*, rather than exercise dependence. And, in fact, there *were* significant relationships found between number of hours spent exercising per week and both body satisfaction and self-esteem. It appeared that women who exercised more hours every week felt better about their appearance and themselves in general. This was in agreement

with other research that has found a link between exercise frequency and body

satisfaction (Hausenblas & Fallon, 2002) and self-esteem (Varnado-Sullivan, Horton, &

Savoy, 2006). It was in disagreement with research that has found a negative relationship

between exercise frequency and body satisfaction (Duncan, Al-Nakeeb, Nevill, & Jones,

2006; Sonstroem, Harlow, & Josephs, 1994; Varnado-Sullivan, Horton, & Savoy, 2006)

and self-esteem (Tiggemann & Williamson, 2000), and with research that has found no

relationship with body satisfaction (Pini, Calamari, Puleggio, & Pullerá, 2007; Russell,

2002) and self-esteem (Moore, 1993). It could be that the reason exercise *dependence*

was not associated with either of these outcomes was because so few women in the

sample achieved a score above the cutoff point on the EDQ. In fact, only 24 of the 99

women in the sample actually qualified as exercise dependent.

One of the analyses for interaction effects was marginally significant. It was

determined that average and high levels of exercise dependence with a high degree of

positive perfectionism together form a fairly significant predictor of body satisfaction,

when controlling for BMI and negative perfectionism. Therefore, women who felt a

greater compulsion to exercise, and who pursued their high personal standards because of

the pleasure and satisfaction their successes bring them, tended to feel more positively

about their appearance. It could be that in addition to having higher standards for

themselves, those women also put more effort into achieving their goals, as evidenced by

their greater commitment to exercising. The greater effort likely translates into greater

success. Consequently, when women put more effort into maintaining their exercise

routines, they may well see the physical enhancements they desire, leading to

improvements in the way they feel about their appearance.

Interestingly, women with low levels of exercise dependence also saw improvements in their body satisfaction when they additionally had a low degree of positive perfectionism. Those women seemingly did not set such high standards for themselves. Their lack of a compulsive need to exercise may have made their appearance less salient to them, leading them to be less critical of the way they look. It could be that many women develop their high standards for beauty as a result of becoming more involved in efforts to enhance it. A common finding in body-image literature is a connection between the degree to which a person focuses on their appearance and their level of dissatisfaction with it (e.g., Cash, Melnyk, & Hrabosky, 2004). Therefore, for women with no dependence on exercise, the lack of compulsive effort they put into trying to improve their physical selves may be the reason they are less demanding of the way they look, and are happy the way they already are.

Both types of perfectionism significantly predicted body satisfaction, while controlling for BMI and the other perfectionism type. As expected, high levels of positive perfectionism were associated with body satisfaction, and high levels of negative perfectionism were associated with body dissatisfaction. These findings were in agreement with previous research that has found an association between positive perfectionism and good body satisfaction (Davis, 1997), and between negative perfectionism and poor body satisfaction (Ashby, Kottman, & Schoen, 1998; Chan & Owens, 2006; Davis, 1997; Haase, Prapavessis, & Owens, 2002; Pearson & Gleaves, 2006). Thus, positive perfectionists appeared to have better body satisfaction than negative perfectionists. This stands to reason, as positive perfectionists tend to be pleased with their achievements whereas negative perfectionists are rarely satisfied with

anything (Slade & Owens, 1998; Terry-Short et al., 1995). Therefore, positive perfectionists will feel good about any successes they have had in improving their appearance, and negative perfectionisms will likely just feel bad about their perceived faults.

Both types of perfectionism also significantly predicted self-esteem, while controlling for the other perfectionism type. Once again, as expected, high levels of positive perfectionism were associated with good self-esteem, and high levels of negative perfectionism were associated with poor self-esteem. These findings correspond to other studies that have found a connection between positive perfectionism and high self-esteem (Ashby & Rice, 2002; Pearson & Gleaves, 2006; Stumpf & Parker, 2000), and between negative perfectionism and low self-esteem (Ashby & Rice, 2002; Ashby, Rice, & Martin, 2006; Gotwals, Dunn, & Wayment, 2003; Pearson & Gleaves, 2006; Rice, Ashby, & Slaney, 1998; Stumpf & Parker, 2000; Trumpeter, Watson, & O'Leary, 2006). It appeared then, that the women who pursued lofty goals because of the satisfaction and enjoyment they feel when they are successful, felt better about themselves than women who set high personal standards in order to avoid something unpleasant. This makes theoretical sense. Perfectionists' self-esteem is largely contingent on their accomplishments (Brown, 1980). Therefore, for women who are in the pursuit of something, they will at least on occasion accomplish their goals, and feel self-satisfaction as a result; this will likely lead to a boost in self-esteem. However, for women who are oriented towards the goal of avoiding a feared outcome, it is their failures in avoidance that will likely most impact them. Research has shown that individuals who are more avoidant oriented are more sensitive to negative stimulation (Gray & McNaughton,

2000). Furthermore, a connection between a lack of success in achieving one's goals and diminished self-esteem has already been established (Crocker & Wolfe, 2001). Therefore, negative perfectionists are "hard-wired" towards focusing on their failures, and evaluating themselves less favourably as a result.

The model as a whole. The path model as it had originally been proposed did not provide a good fit for the sample data. However, after several alterations were made, the fit improved substantially and became significant. First, two nonsignificant paths were removed; these changes have already been discussed. Second, four paths were added, as they were suggested by the modification indices and were theoretically justifiable. The first path was between body satisfaction and self-esteem, and it resulted in a positive prediction. This stands to reason, as it has often been found that body satisfaction is positively related to self-esteem (e.g., Frost & McKelvie, 2004). The second and third paths added to the model were between the exercise motivators and body satisfaction. Specifically, health and fitness motivations were found to positively predict body satisfaction, and appearance and weight control motivations were found to negatively predict it. The inclusion of these two paths was conceptually justified, and was further supported by a number of other studies that have found similar associations (Cash, Novy, & Grant, 1994; Furnham, Badmin, & Sneade, 2002; Hubbard, Gray, & Parker, 1998; LePage, Crowther, Harrington, & Engler, 2008; McDonald & Thompson, 1992; Prichard & Tiggemann, 2008; Smith, Handley, & Eldredge, 1998; Tiggemann & Williamson, 2000). In an effort to explain other aspects of the relationships between exercise dependence and body satisfaction and self-esteem, these direct paths were left out of the model in an oversight. It was only fitting that they be included. The fourth path that was

added was a correlation between the error variances for the two subscales of the Positive and Negative Perfectionism Scale. Since both types of perfectionism were derived from the same measure, there may likely be a good reason for why the error variances significantly covaried for these two perfectionism types.

The final model provided a good fit for the data. It suggested that exercise dependence was indeed predictive of perfectionism, both the positive and negative varieties. Further, for women who were negative perfectionists, the relationship was entirely explained by their desire to improve their appearance and control their weight through exercise. For women who were positive perfectionists, the relationship was at least partially (if not fully) due to these same reasons for exercising. In addition, this exercise motivation was predictive of body dissatisfaction. The motivation to exercise out of a desire to benefit health and fitness levels on the other hand, was predictive of better body satisfaction. The model also confirmed the previously discussed relationships between positive perfectionism and higher body satisfaction and self-esteem, and between negative perfectionism and lower body satisfaction and self-esteem. Finally, the path model showed a positive association between body satisfaction and self-esteem. Therefore, people who felt good about their appearance also tended to feel better about themselves in general.

Practical and Theoretical Implications

The findings suggested that exercise in general is beneficial for women, both in terms of body satisfaction and self-esteem. As for exercise dependence, it is hard to make any conclusive statements, since no significant relationships were found between it and the outcome variables. It appears, however, that whether exercise dependence is

healthy or harmful in terms of body satisfaction and self-esteem, may have a lot to do with its relationship to perfectionism. Previous research has found that exercise dependence is highly related to perfectionism (Brehm & Steffen, 1998; Gulker, Laskis, & Kuba, 2001). The present study showed very clearly that the positive form of perfectionism is related to better body satisfaction and self-esteem, and the negative form is related to poorer body satisfaction and self-esteem.

In order to prevent the harm associated with compulsive exercise, it would likely be better to address the focus with which individuals pursue their challenging exercise goals, rather than addressing the exercise behaviours themselves. Women who push themselves physically because they are afraid of what will happen if they stop, may be at a much greater risk of suffering harm than are women who push themselves because they enjoy the sense of accomplishment. It seemed apparent as well, from the results of this study, that this goal-focus is a more reliable predictor of the outcome of exercise than are the motivations with which women exercise. It is true that exercise in the pursuit of improved health and fitness predicted better body satisfaction, and exercise in the pursuit of improved appearance and weight control tended to predict poorer body satisfaction. However, the latter motivator was significantly related to both types of perfectionism, and positive perfectionism was found to be predictive of higher levels of both body satisfaction and self-esteem. Therefore, any interventions designed to assist compulsive exercisers with their body image or self-esteem may be more effective if they focus on the pursuit/avoidance aspect of why these individuals push themselves so hard, rather than on whether they are exercising for health and fitness, or for appearance and weight.

Additionally, the findings suggested that perhaps another key to individuals having a positive body image is for them to not get too invested in attempting to enhance their physical selves, whether it is through exercise or by some other means. It is certainly important for people to care about their health, but it may prove detrimental to their self-image if they spend too much time focusing on the things about themselves that they want to change.

Limitations

The present study had some notable limitations. The sample size was less than desirable for the types of analyses that were used to test the study's hypotheses. For the most part, a larger sample would not likely have had an important effect on the significant results that were obtained, since smaller sample sizes tend to reduce the power of significance tests (Garson, 2009). Therefore, the significant analyses in the present study would likely still be significant with a larger sample because increased power would increase the ability to find an effect, not decrease it (Cohen, 1992). A larger sample size may have led some nonsignificant results to become significant, for underlying relationships that perhaps do exist, but have only a small to medium sized effect. Further, an increased sample size would have increased the stability of the parameter estimates from the path analysis.

Another limitation was the small number of participants that actually qualified as exercise dependent. It is difficult to make conclusive statements regarding how the results of the study might generalize to a group of exercise dependent women. It could be that exercise dependence interacts significantly with perfectionism type in the prediction of body satisfaction and self-esteem for women who actually are compulsive

exercisers. It is possible that certain relationships are simply not evident among women who do not exercise excessively.

Suggestions for Future Research

Future studies on this topic should consider including male participants. It would be interesting to compare men and women on their motivations to exercise, and on the way they are affected psychologically by varying degrees of physical activity. There could be notable differences, for instance, in how participating in a high degree of physical activity impacts their body image and self-esteem.

It is also important that future studies using this model or a similar model compare exercise dependent individuals to those that exercise moderately, and also to those that do not exercise at all. Perfectionism levels may be much higher among those who are exercise dependent, and this could have a considerable impact on the results that are obtained for these individuals, relative to less excessive exercisers.

Further, it is important to confirm the final model with another sample. The model as originally proposed was revised and retested, achieving good fit. However, once alterations to a model are made post hoc, the analyses become exploratory, rather than confirmatory (Byrne, 2001). Therefore, to ensure that the changes made to the model are replicable with another sample, rather than being idiosyncratic characteristics of the present sample, the final model must be reassessed with different data.

Summary

The literature on exercise and exercise dependence contains many inconsistencies regarding whether exercise results in psychological health or psychological harm. Many of these inconsistencies related to body satisfaction and self-esteem. In order to prevent

the ill-effects of engaging in exercise, while maintaining all of its benefits, it was important to try to understand the different paths that might lead from exercise to improved well-being in some situations, and from exercise to harmful repercussions in others. This study has helped in that regard, identifying the interacting roles of exercise dependence, motivations for exercising, and the type of perfectionism that exercisers display, and the differing effects they have on body satisfaction and self-esteem. Further, in the interests of prevention and treatment, it is important to know which women will be at an increased risk of lowered body satisfaction and self-esteem as a result of their exercise participation. The present study's findings will assist in this area as well.

References

Acock, A. (1997). Working with missing data. *Family Science Review*, 1(10), 76-102.

Adler, A. (1956). The neurotic disposition. In H. L. Ansbacher & R. R. Ansbacher (Eds.), *The individual psychology of Alfred Adler* (pp. 239-262). New York: Harper.

Anderson, C. B., & Bulik, C. M. (2004). Gender differences in compensatory behaviors, weight and shape salience, and drive for thinness. *Eating Behaviors, 5*(1), 1-11.

Ashby, J. S., Kottman, T., & Schoen, E. (1998). Perfectionism and eating disorders reconsidered. *Journal of Mental Health Counseling, 20*(3), 261-271.

Ashby, J. S., & Rice, K. G. (2002). Perfectionism, dysfunctional attitudes, and self-esteem: A structural equations analysis. *Journal of Counseling & Development, 80*(2), 197-203.

Ashby, J. S., Rice, K. G., & Martin, J. L. (2006). Perfectionism, shame, and depressive symptoms. *Journal of Counseling & Development, 84*(2), 148-156.

Bamber, D., Cockerill, I. M., & Carroll, D. (2000). The pathological status of exercise dependence. *British Journal of Sports Medicine,* 34, 125-132.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182.

Baumeister, R. F. (Ed.). (1993). *Self-esteem: The puzzle of low self-regard*. Plenum series
in social/clinical psychology. New York, NY, US: Plenum Press.

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-
esteem cause better performance, interpersonal success, happiness, or healthier
lifestyles? *Psychological Science in the Public Interest, 4*(1), 1-44.

Blaydon, M. J., Lindner, K. J., & Kerr, J. H. (2004). Metamotivational characteristics of
exercise dependence and eating disorders in highly active amateur sport participants.
Personality and Individual Differences, 36(6), 1419-1432.

Bollen, K. A., & Stine, R. A. (1992). Bootstrapping goodness-of-fit measures in
structural equation models. *Sociological Methods and Research*, 21, 205-229.

Brehm, B. J., & Steffen, J. J. (1998). Relation between obligatory exercise and eating
disorders. *American Journal of Health Behavior, 22*(2), 108-119.

Brown, I. (1997). A theoretical model of the behavioural addictions – applied to
offending. In J. E. Hodge, M. McMurran, & C. R. Hollin (Eds.), *Addicted to
crime* (pp. 13-65). Chichester: Wiley.

Browne, M. W., & Cudek, R. (1993). Alternative ways of assessing model fit. In K. A.
Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136-162).
Newbury Park, CA: Sage.

Burns, D. D. (1980). The perfectionist's script for self-defeat. *Psychology Today,* 50, 34-
52.

Byrne, B. M. (2001). *Structural equation modeling with AMOS*: *Basic concepts, applications and programming*. Mahwah, NJ: Lawrence Erlbaum.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67*(2), 319-333.

Cash, T. F. (2002). Cognitive behavioral perspectives on body image. In T. F. Cash & T. Pruzinsky (Eds.), *Body image: A handbook of theory, research, and clinical practice* (pp. 38-46). New York: Guilford Press.

Cash, T. F., & Pruzinsky, T. (Eds.). (1990). *Body images: Development, deviance, and change*. New York, NY, US: Guilford Press.

Cash, T. F., Fleming, E. C., Alindogan, J., Steadman, L., & Whitehead, A. (2002). Beyond body image as a trait: The development and validation of the body image states scale. *Eating Disorders: The Journal of Treatment & Prevention, 10*(2), 103-113.

Cash, T. F., & Hicks, K. L. (1990). Being fat versus thinking fat: Relationships with body image, eating behaviors, and well-being. *Cognitive Therapy and Research, 14*(3), 327-341.

Cash, T. F., Melnyk, S. E., & Hrabosky, J. I. (2004). The assessment of body image investment: An extensive revision of the appearance schemas inventory. *International Journal of Eating Disorders, 35*(3), 305-316.

Cash, T. F., Novy, P. L., & Grant, J. R. (1994). Why do women exercise? Factor analysis and further validation of the reasons for exercise inventory. *Perceptual and Motor Skills, 78*(2), 539-544.

Cash, T. F., & Roy, R. E. (1999). Pounds of flesh: weight, gender, and body images. In J. Sobal & D. Maurer (Eds.), *Interpreting Weight: The Social Management of Fatness and Thinness* (pp. 209-228). Hawthorne, NY; Aldine de Gruyter.

Cash, T. F., & Szymanski, M. L. (1995). The development and validation of the body-image ideals questionnaire. *Journal of Personality Assessment, 64*(3), 466-477.

Chan, C. K. Y., & Owens, R. G. (2006). Perfectionism and eating disorder symptomatology in Chinese immigrants: Mediating and moderating effects of ethnic identity and acculturation. *Psychology & Health, 21*(1), 49-63.

Chan, C. S., & Grossman, H. Y. (1988). Psychological effects of running loss on consistent runners. *Perceptual and Motor Skills, 66*(3), 875-883.

Chen, X., Ender, P., Mitchell, M. and Wells, C. (2003). *Regression with SPSS.* Retrieved August 29, 2009, from http://www.ats.ucla.edu/stat/spss/webbooks/reg/default.htm.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155-159.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*, (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Coopersmith, S. (1981). *The antecedents of self-esteem.* Palo Alto, CA: Consulting

    Psychologists Press.

Crandall, R. (1973). The measurement of self-esteem and related constructs. In J. P.

    Robinson & P. R. Shaver (Eds.), *Measures of social psychological attitudes* (pp.

    45-167). Ann Arbor, MI: Institute for Social Research, University of Michigan.

Crocker, J., & Wolfe, C. T. (2001). Contingencies of self-worth. *Psychological Review,*

    108(3), 593-623.

Davis, C. (1990). Weight and diet preoccupation and addictiveness: The role of exercise.

    Personality and Individual Differences, 11(8), 823-827.

Davis, C. (1997). Normal and neurotic perfectionism in eating disorders: An interactive

    model. *International Journal of Eating Disorders, 22*(4), 421-426.

Davis, C., & Fox, J. (1993). Excessive exercise and weight preoccupation in women.

    Addictive Behaviors, 18(2), 201-211.

De Coverley Veale, D. M. (1987). Exercise dependence. *British Journal of Addiction,*

    82(7), 735-740.

Duncan, M. J., Al-Nakeeb, Y., Nevill, A. M., & Jones, M. V. (2006). Body

    dissatisfaction, body fat and physical activity in British children. *International*

    Journal of Pediatric Obesity, 1(2), 89-95.

Edwards, G., Gross, M. M., Keller, M., Moser, J., & Room, R. (Eds.). (1977). *Alcohol-*

    Related Disabilities, WHO Offset Publishers no. 32. Geneva: WHO; 1977.

Fisher, E., & Thompson, J. K. (1994). A comparative evaluation of cognitive-behavioral therapy (CBT) versus exercise therapy (ET) for the treatment of body image disturbance: Preliminary findings. *Behavior Modification, 18*(2), 171-185.

Flett, G. L., Hewitt, P. L., & Dyck, D. G. (1989). Self-oriented perfectionism, neuroticism and anxiety. *Personality and Individual Differences, 10*(7), 731-735.

Freedman, J. (1978*). Happy people: What happiness is, who has it, and why questionnaire.* London: Hodder & Stoughton.

Frost, J. & McKelvie, S. (2004). Self-esteem and body satisfaction in male and female elementary school, high school, and university students. *Sex Roles,* 51, 45-54

Furnham, A., Badmin, N., & Sneade, I. (2002). Body image dissatisfaction: Gender differences in eating attitudes, self-esteem, and reasons for exercise. *Journal of Psychology: Interdisciplinary and Applied, 136*(6), 581-596.

Garner, D. M., & Garfinkel, P. E. (1979). The eating attitudes test: An index of the symptoms of anorexia nervosa. *Psychological Medicine, 9*(2), 273-279.

Garner, D. M., Garfinkel, P. E., Rockert, W., & Olmsted, M. P. (1987). A prospective study of eating disturbances in the ballet. *Psychotherapy and Psychosomatics, 48*(1-4), 170-175.

Garson, G. D. (2009). *Structural equation modeling.* Retrieved September 6, 2009, from http://faculty.chass.ncsu.edu/garson/PA765/structur.htm#assume.

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference. 11.0 update* (4th ed.). Boston: Allyn & Bacon.

Gibbs, J., & Hines, A. (1992). Negotiating ethnic identity: Issues for Black-White Biracial adolescents. In M. Root (Ed.), *Racially mixed people in America* (pp. 223-238). Newbury Park, CA: Sage Publications.

Gilbert, S. (2000). *Counseling for eating disorders*. London: Sage.

Gotwals, J. K., Dunn, J. G. H., & Wayment, H. A. (2003). An examination of perfectionism and self-esteem in intercollegiate athletes. *Journal of Sport Behavior, 26*(1), 17-38.

Gray, J.A., & McNaughton, N. (2000). *The neuropsychology of anxiety* (2nd ed.). Oxford: Oxford University Press.

Gray, J. A. (1973). Causal models of personality and how to test them. In J. R. Royce (Ed.), *Multivariate analysis and psychological theory* (pp. 409–463). London: Academic Press.

Groves, M., Biscomb, K., Nevill, A., & Matheson, H. (2008). Exercise dependence, self-esteem and identity reinforcement: A comparison of three universities in the United Kingdom. *Sport in Society, 11*(1), 59-73.

Gulker, M. G., Laskis, T. A., & Kuba, S. A. (2001). Do excessive exercisers have a higher rate of obsessive-compulsive symptomatology? *Psychology, Health & Medicine, 6*(4), 387-398.

Haase, A. M., & Prapavessis, H. (2004). Assessing the factor structure and composition of the positive and negative perfectionism scale in sport. *Personality and Individual Differences, 36*(7), 1725-1740.

Haase, A. M., Prapavessis, H., & Owens, R. G. (1999). Perfectionism and eating attitudes in competitive rowers: Moderating effects of body mass, weight classification and gender. *Psychology & Health, 14*(4), 643-657.

Haase, A. M., Prapavessis, H., & Owens, R. G. (2002). Perfectionism, social physique anxiety and disordered eating: A comparison of male and female elite athletes. *Psychology of Sport and Exercise, 3*(3), 209-222.

Hamachek, D. E. (1978). Psychodynamics of normal and neurotic perfectionism. *Psychology: A Journal of Human Behavior, 15*(1), 27-33.

Hart, E. A., Leary, M. R., & Rejeski, W. J. (1989). The measurement of social physique anxiety. *Journal of Sport & Exercise Psychology, 11*(1), 94-104.

Hausenblas, H. A., & Downs, D. S. (2002). Exercise dependence: A systematic review. *Psychology of Sport and Exercise, 3*(2), 89-123.

Hausenblas, H. A., & Fallon, E. A. (2002). Relationship among body image, exercise behavior, and exercise dependence symptoms. *International Journal of Eating Disorders, 32*(2), 179-185.

Hausenblas, H. A., & Fallon, E. A. (2006). Exercise and body image: A meta-analysis. *Psychology & Health, 21*(1), 33-47.

Hu, L.-T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1-55.

Hubbard, S. T., Gray, J. J., & Parker, S. (1998). Differences among women who exercise for 'food related' and 'non-food related' reasons. *European Eating Disorders Review, 6*(4), 225-265.

Johnson, F., & Wardle, J. (2005). Dietary restraint, body dissatisfaction, and psychological distress: A prospective analysis. *Journal of Abnormal Psychology, 114*(1), 119-125.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago: Scientific Software International.

Kline, R. B. (2005). Principles and practice of structural equation modeling (2nd ed.). New York: Guilford.

Kline, R. B. (1998). *Principles and practice of structural equation modeling*. NY: Guilford Press.

Krane, V., Stiles-Shipley, J. A., Waldron, J., & Michalenok, J. (2001). Relationships among body satisfaction, social physique anxiety, and eating behaviors in female athletes and exercisers. *Journal of Sport Behavior, 24*(3), 247-264.

LePage, M. L., Crowther, J. H., Harrington, E. F., & Engler, P. (2008). Psychological

    correlates of fasting and vigorous exercise as compensatory strategies in

    undergraduate women. *Eating Behaviors, 9*(4), 423-429.

Levitt, D. H. (2003). Drive for thinness and fear of fat: Separate yet related constructs?

    Eating Disorders: The Journal of Treatment & Prevention, 11(3), 221-234.

Lustyk, M. K. B., Widman, L., Paschane, A. A. E., & Olson, K. C. (2004). Physical

    activity and quality of life: Assessing the influence of activity frequency, intensity,

    volume, and motives. *Behavioral Medicine, 30*(3), 124-131.

Martin, K. A., & Hausenblas, H. A. (1998). Psychological commitment to exercise and

    eating disorder symptomatology among female aerobic instructors. *The Sport

    Psychologist, 12*(2), 180-190.

McCabe, M. P., & Ricciardelli, L. A. (2003). Body image and strategies to lose weight

    and increase muscle among boys and girls. *Health Psychology, 22*(1), 39-46.

McClelland, G.H., & Judd, C.M. (1993). Statistical difficulties of detecting interactions

    and moderator effects. *Psychological Bulletin, 114*(2), 376-390.

McDonald, K., & Thompson, J. K. (1992). Eating disturbance, body image

    dissatisfaction, and reasons for exercising: Gender differences and correlational

    findings. *International Journal of Eating Disorders, 11*(3), 289-292.

McLaren, L., Gauvin, L., & White, D. (2001). The role of perfectionism and excessive commitment to exercise in explaining dietary restraint: Replication and extension. *International Journal of Eating Disorders, 29*(3), 307-313.

Moore, K. A. (1993). The effect of exercise on body image, self-esteem and mood. *Mental Health in Australia, 5*(1), 38-40.

Morgan, W. P. (1979). Negative addiction in runners. *Physician and Sports Medicine, 7,* 57-70.

Mussap, A. J. (2007). Motivational processes associated with unhealthy body change attitudes and behaviours. *Eating Behaviors, 8*(3), 423-428.

Nudelman, S., Rosen, J. C., & Leitenberg, H. (1988). Dissimilarities in eating attitudes, body image distortion, depression, and self-esteem between high-intensity male runners and women with bulimia nervosa. *International Journal of Eating Disorders, 7*(5), 625-634.

Ogden, J., Veale, D., & Summers, Z. (1997). The development and validation of the exercise dependence questionnaire. *Addiction Research, 5*(4), 343-355.

Pacht, A. R. (1984). Reflections on perfection. *American Psychologist, 39*(4), 386-390.

Pearson, C. A., & Gleaves, D. H. (2006). The multiple dimensions of perfectionism and their relation with eating disorder features. *Personality and Individual Differences, 41*(2), 225-235.

Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: A review of mental and physical health benefits associated with physical activity. *Current Opinion in Psychiatry, 18*(2), 189-193.

Pini, M., Calamari, E., Puleggio, A., & Pullerá , M. (2007). Exercise commitment and proneness to eating disorders in a group of physical education teachers. *Perceptual and Motor Skills, 105*(2), 639-645.

Prichard, I., & Tiggemann, M. (2008). Relations among exercise type, self-objectification, and body image in the fitness centre environment: The role of reasons for exercise. *Psychology of Sport and Exercise, 9*(6), 855-866.

Rice, K. G., Ashby, J. S., & Slaney, R. B. (1998). Self-esteem as a mediator between perfectionism and depression: A structural equations analysis. *Journal of Counseling Psychology, 45*(3), 304-314.

Rice, K. G., & Preusser, K. J. (2002). The Adaptive/Maladaptive perfectionism scale. *Measurement and Evaluation in Counseling and Development, 34*(4), 210-222.

Rodin, J., Silberstein, L. R., & Striegel-Moore, R. H. (1984). Women and weight: A normative discontent. *Nebraska Symposium on Motivation, 32*, 267-307.

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

Rosenberg, M. (1979). *Conceiving the self.* New York: Basic Books.

Russell, W. D. (2002). Comparison of self-esteem, body satisfaction, and social physique anxiety across males of different exercise frequency and racial background. *Journal of Sport Behavior, 25*(1), 74-90.

Scully, D., Kremer, J., Meade, M. M., Graham, R. & Dudgeon, K. (1998). Physical exercise and psychological well being: A critical review. *British Journal of Sports Medicine, 32*(2), 111-120.

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7*, 4.

Silber, E., & Tippett, J. S. (1965). Self-esteem: Clinical assessment and measurement validation. *Psychological Reports, 16*(3), 1017-1071.

Silberstein, L. R., Striegel-Moore, R. H., Timko, C., & Rodin, J. (1988). Behavioral and psychological implications of body dissatisfaction: Do men and women differ? *Sex Roles, 19*(3-4), 219-232.

Slade, P. D. (in press). The general motivation underlying anorexia nervosa and bulimia nervosa. In J. Buendia (Ed.), *Psychological problems in adolescence*. Madrid: Piramide.

Slade, P. D., & Owens, R. G. (1998). A dual process model of perfectionism based on reinforcement theory. *Behavior Modification, 22*(3), 372-390.

Smith, B. L., Handley, P., & Eldredge, D. A. (1998). Sex differences in exercise

motivation and body-image satisfaction among college students. *Perceptual and*

Motor Skills, 86(2), 723-732.

Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural

equation models. In S. Leinhardt (Ed.), *Sociological Methodology 1982* (pp. 290-

312). Washington DC: American Sociological Association.

Sonstroem, R. J., Harlow, L. L., & Josephs, L. (1994). Exercise and self-esteem: Validity

of model expansion and exercise associations. *Journal of Sport & Exercise*

Psychology, 16(1), 29-42.

Spence, J. C., McGannon, K. R., & Poon, P. (2005). The effect of exercise on global self-

esteem: A quantitative review. *Journal of Sport & Exercise Psychology, 27*(3), 311-

334.

Stein, C. (1960). Multiple Regression. In Olkin, I, Churye, SG, Hoeffding, W, Madow,

WG, & Mann, HB (Eds.), *Contributions to probability and statistics*. Stanford,

Calif.: Stanford University Press.

Stevens, J. P. (2007). *Intermediate statistics: A modern approach* (3rd ed.). Hillsdale, NJ:

Lawrence Erlbaum.

Stevens, J. P. (2002). Applied multivariate statistics for the social sciences (4th ed.).

Mahwah, NJ: Lawrence Erlbaum.

Stice, E., Mazotti, L., Krebs, M., & Martin, S. (1998). Predictors of adolescent dieting

behaviors: A longitudinal study. *Psychology of Addictive Behaviors, 12*(3), 195-205.

Stumpf, H., & Parker, W. D. (2000). A hierarchical structural analysis of perfectionism

and its relation to other personality characteristics. *Personality and Individual

Differences, 28*(5), 837-852.

Tabachnick, B.G., & Fidell, L.S. (2006). *Using multivariate statistics* (5th ed.). New

York: Pearson.

Terry-Short, L. A., Glynn Owens, R., Slade, P. D., & Dewey, M. E. (1995). Positive and

negative perfectionism. *Personality and Individual Differences, 18*(5), 663-668.

Tiggemann, M., & Williamson, S. (2000). The effect of exercise on body satisfaction and

self-esteem as a function of gender and age. *Sex Roles, 43*(1-2), 119-127.

Trumpeter, N., Watson, P. J., & O'Leary, B. J. (2006). Factors within multidimensional

perfectionism scales: Complexity of relationships with self-esteem, narcissism, self-

control, and self-criticism. *Personality and Individual Differences, 41*(5), 849-860.

Varnado-Sullivan, P. J., Horton, R., & Savoy, S. (2006). Differences for gender, weight

and exercise in body image disturbance and eating disorder symptoms. *Eating and

Weight Disorders, 11*(3), 118-125.

Vartanian, L. R. & Shaprow, J. G. (2008). Effects of weight stigma on exercise

motivation and behavior: A preliminary investigation among college-aged females.

Journal of Health Psychology, 13(1), 131-138.

Yates, A. (1991). Compulsive exercise and the eating disorders: Toward an integrated

theory of activity. Philadelphia, PA, US: Brunner/Mazel.

Appendix A

Posted Advertisement

University
of Windsor

A RESEARCH STUDY
NEEDS FEMALE PARTICIPANTS!!

The study is called: *Frequency of Exercise Participation and its*
Relationship to Personality in Women

In order to participate:
- **You must be female**
- **You must be 18-years-old or older**
- **You must currently reside in either Canada or the United States**

IT WILL ONLY TAKE AROUND *20 MINUTES* OF YOUR TIME AND YOU WILL HAVE THE OPTION OF BEING ENTERED INTO A DRAW TO WIN ONE OF FOUR *$50 GIFT CARDS FROM AMAZON.CA OR AMAZON.COM*

If you wish to participate please go to the web address:
http://web4.uwindsor.ca/exercisesurvey and complete the short survey.

The information you provide will be COMPLETELY CONFIDENTIAL.
You will only be asked to provide an email address at which you can be notified in the event that you win a prize. The email address you provide will be stored separately from the information you enter into the survey and cannot be connected to your answers *in any way, by any one, at any time.*

The study is being conducted by Ian Bishop and supervised by Dr. Ken Cramer, from the Psychology Department at the University of Windsor. If you have any questions about the research, please feel free to contact Dr. Cramer via email at kcramer@uwindsor.ca. This study has been reviewed and has received ethics clearance through the University of Windsor Ethics Board.

Appendix B

Online Advertisement

A research study investigating the relationship between exercise frequency and

personality in women needs female participants! I am a graduate student in psychology,

at the University of Windsor, in Windsor, Ontario Canada. My study has been reviewed

and has received ethics clearance through the University of Windsor Ethics Board. If you

would like to participate, please visit: http://web4.uwindsor.ca/exercisesurvey and

complete my short survey; it should only take about 20 minutes of your time, and you

will have the option of being entered into a draw to win one of four $50 gift cards from

Amazon.ca or Amazon.com! You must be 18 or older, female, and live in either Canada

or the United States to participate.

Appendix C

Letter of Permission

In regards to the following site: _____St. Denis Centre_____

I allow the following for the purposes of advertising a research study entitled *Frequency of Exercise Participation and its Relationship to Personality in Women*:

☒ Flyers to be posted in agreed upon locations

☐ Flyers to be handed out in person

I have seen and approved the flyers in question, and all of my questions have been answered to my satisfaction. I grant my permission for the following period of time:
From: __8/18/09__ To: __8/31/09__
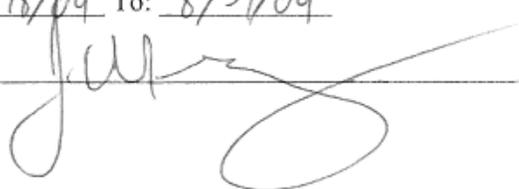
Signature: _____ Date: __Aug 19 '09__

Appendix D

EDQ

Weight _____ Height _____

We would like to know how much you exercise. Please consider exercise as being any structured activity which increases your heart rate (e.g., running, cycling, aerobics, weight training) and complete the following sentence:

I exercise for _____ hours per week.

Below are a series of statements that people have used to describe their attitudes to exercise. Please rate each of the statements by indicating the appropriate number on the scale for how much it describes your attitude to your own exercise over the past month.

	Strongly Disagree					**Strongly Agree**	
1. My level of exercising makes me tired at work	1	2	3	4	5	6	7
2. After an exercise session I feel happier about life	1	2	3	4	5	6	7
3. If I cannot exercise I feel irritable	1	2	3	4	5	6	7
4. The rest of my life has to fit in around my exercise	1	2	3	4	5	6	7
5. After an exercise session I feel less anxious	1	2	3	4	5	6	7
6. I exercise to look attractive	1	2	3	4	5	6	7
7. I sometimes miss time at work to exercise	1	2	3	4	5	6	7
8. After an exercise session I feel that I am a better person	1	2	3	4	5	6	7
9. If I cannot exercise I feel agitated	1	2	3	4	5	6	7
10. I exercise to meet other people	1	2	3	4	5	6	7
11. I hate not being able to exercise	1	2	3	4	5	6	7
12. I exercise to keep myself occupied	1	2	3	4	5	6	7
13. If I cannot exercise I feel I cannot cope with life	1	2	3	4	5	6	7

14. I exercise to control my weight   1   2   3   4   5   6   7

15. I have little energy for my partner, family, and friends   1   2   3   4   5   6   7

16. Being thin is the most important thing in my life   1   2   3   4   5   6   7

17. I feel guilty about the amount I exercise   1   2   3   4   5   6   7

18. I exercise to be healthy   1   2   3   4   5   6   7

19. After an exercise session I feel thinner   1   2   3   4   5   6   7

20. My level of exercise has become a problem   1   2   3   4   5   6   7

21. I make a decision to exercise less but cannot stick to it   1   2   3   4   5   6   7

22. I exercise for the same amount of time each week   1   2   3   4   5   6   7

23. After an exercise session I feel more positive about myself   1   2   3   4   5   6   7

24. My weekly pattern of exercise is repetitive   1   2   3   4   5   6   7

25. My pattern of exercise interferes with my social life   1   2   3   4   5   6   7

26. I exercise to feel fit   1   2   3   4   5   6   7

27. My exercising is ruining my life   1   2   3   4   5   6   7

28. I exercise to prevent heart disease and other illnesses   1   2   3   4   5   6   7

29. If I cannot exercise I will miss the social life   1   2   3   4   5   6   7

Appendix E

REI

People exercise for a variety of reasons. When people are asked why they exercise, their answers are sometimes based on the reasons they believe they *should* have for exercising. What we want to know are the reasons people *actually* have for exercising. Please respond to items as honestly as possible by indicating the number on the scale that corresponds to the degree to which the following statements are true for you:

	Not at all important	Moderately important	Extremely important
1. I exercise to improve my cardiovascular fitness.	1　2　3	4　5	6　7
2. I exercise to cope with stress, anxiety.	1　2　3	4　5	6　7
3. I exercise to improve my appearance.	1　2　3	4　5	6　7
4. I exercise to improve my overall body shape.	1　2　3	4　5	6　7
5. I exercise to improve my mood.	1　2　3	4　5	6　7
6. I exercise to alter a specific area of my body.	1　2　3	4　5	6　7
7. I exercise to be attractive to members of the opposite sex.	1　2　3	4　5	6　7
8. I exercise to improve my flexibility, coordination.	1　2　3	4　5	6　7
9. I exercise to meet new people.	1　2　3	4　5	6　7
10. I exercise to prevent weight gain.	1　2　3	4　5	6　7
11. I exercise to increase my resistance to illness and disease.	1　2　3	4　5	6　7
12. I exercise to do what is socially expected.	1　2　3	4　5	6　7
13. I exercise to increase my energy level.	1　2　3	4　5	6　7
14. I exercise to redistribute my weight.	1　2　3	4　5	6　7
15. I exercise to improve my endurance, stamina.	1　2　3	4　5	6　7
16. I exercise to cope with sadness, depression.	1　2　3	4　5	6　7
17. I exercise to socialize with friends.	1　2　3	4　5	6　7
18. I exercise to improve my overall health.	1　2　3	4　5	6　7
19. I exercise to be slim.	1　2　3	4　5	6　7
20. I exercise to maintain my physical well-being.	1　2　3	4　5	6　7
21. I exercise to have fun.	1　2　3	4　5	6　7
22. I exercise to improve my strength.	1　2　3	4　5	6　7
23. I exercise to be sexually desirable.	1　2　3	4　5	6　7
24. I exercise to lose weight.	1　2　3	4　5	6　7

Appendix F

PANPS

For each of the items below, please respond with the appropriate number on the scale according to how much you feel that the following statements describe you:

1. When I start something I feel anxious that I might fail.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

2. My family and friends are proud of me when I do really well.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

3. I take pride in being meticulous when doing things.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

4. I set impossibly high standards for myself

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

5. I try to avoid the disapproval of others at all costs.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

6. I like the acclaim I get for an outstanding performance.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

7. When I am doing something I cannot relax until it is perfect.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

8. It feels as though my best is never good enough for other people.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

9. Producing a perfect performance is a reward in its own right.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

10. The problem of success is that I must work even harder.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

11. If I make a mistake I feel that the whole thing is ruined.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

12. I feel dissatisfied with myself unless I am working towards a higher standard all the time.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

13. I know the kind of person I ought or want to be, but feel I always fall short of this.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

14. Other people respect me for my achievements.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

15. As a child however well I did, it never seemed good enough to please my parents.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

16. I think everyone loves a winner.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

17. Other people expect nothing less than perfection from me.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

18. When I am competing against others, I am motivated by wanting to be the best.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

19. I feel good when pushing out the limits.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

20. When I achieve my goals I feel dissatisfied.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

21. My high standards are admired by others.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

22. If I fail people, I fear they will cease to respect or care for me.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

23. I like to please other people by being successful.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

24. I gain great approval from others by the quality of my accomplishments.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

25. My successes spur me on to greater achievements.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

26. I feel guilty or ashamed if I do less than perfectly.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

27. No matter how well I do I never feel satisfied with my performance.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

28. I believe that rigorous practice makes for perfection.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

29. I enjoy the glory gained by my successes.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

30. I gain deep satisfaction when I have perfected something.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

31. I feel I have to be perfect to gain people's approval.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

32. My parents encouraged me to excel.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

33. I worry what others think if I make mistakes.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

34. I get fulfilment from totally dedicating myself to a task.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

35. I like it when others recognize that what I do requires great skill and effort to perfect.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

36. The better I do, the better I am expected to do by others.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

37. I enjoy working towards greater levels of precision and accuracy

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

38. I would rather not start something than risk doing it less than perfectly.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

39. When I do things I feel others will judge critically the standard of my work.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

40. I like the challenge of setting very high standards for myself.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Don't Know**	**Agree**	**Strongly Agree**

Appendix G

BISS

For each of the items below, indicate the statement that best describes how you feel right now, at this very moment. Read the items carefully to be sure the statement you choose accurately and honestly describes how you feel right now.

1.   Right now I feel...
   - ☐   *Extremely dissatisfied* with my physical appearance
   - ☐   *Mostly dissatisfied* with my physical appearance
   - ☐   *Moderately dissatisfied* with my physical appearance
   - ☐   *Slightly dissatisfied* with my physical appearance
   - ☐   *Neither dissatisfied nor satisfied* with my physical appearance
   - ☐   *Slightly satisfied* with my physical appearance
   - ☐   *Moderately satisfied* with my physical appearance
   - ☐   *Mostly satisfied* with my physical appearance
   - ☐   *Extremely satisfied* with my physical appearance

2.   Right now I feel...
   - ☐   *Extremely dissatisfied* with my body size and shape
   - ☐   *Mostly dissatisfied* with my body size and shape
   - ☐   *Moderately dissatisfied* with my body size and shape
   - ☐   *Slightly dissatisfied* with my body size and shape
   - ☐   *Neither dissatisfied nor satisfied* with my body size and shape
   - ☐   *Slightly satisfied* with my body size and shape
   - ☐   *Moderately satisfied* with my body size and shape
   - ☐   *Mostly satisfied* with my body size and shape
   - ☐   *Extremely satisfied* with my body size and shape

3.　　Right now I feel...
- ☐　　*Extremely dissatisfied* with my weight
- ☐　　*Mostly dissatisfied* with my weight
- ☐　　*Moderately dissatisfied* with my weight
- ☐　　*Slightly dissatisfied* with my weight
- ☐　　*Neither dissatisfied nor satisfied* with weight
- ☐　　*Slightly satisfied* with my weight
- ☐　　*Moderately satisfied* with my weight
- ☐　　*Mostly satisfied* with my weight
- ☐　　*Extremely satisfied* with my weight

4.　　Right now I feel...
- ☐　　*Extremely* physically *attractive*
- ☐　　*Very* physically *attractive*
- ☐　　*Moderately* physically *attractive*
- ☐　　*Slightly* physically *attractive*
- ☐　　*Neither attractive nor unattractive*
- ☐　　*Slightly* physically *unattractive*
- ☐　　*Moderately* physically *unattractive*
- ☐　　*Very* physically *unattractive*
- ☐　　*Extremely* physically *unattractive*

5.　　Right now I feel...
- ☐　　*A great deal worse* about my looks than I usually feel
- ☐　　*Much worse* about my looks than I usually feel
- ☐　　*Somewhat worse* about my looks than I usually feel
- ☐　　*Just slightly worse* about my looks than I usually feel
- ☐　　*About the same* about my looks as usual
- ☐　　*Justly slightly better* about my looks than I usually feel
- ☐　　*Somewhat better* about my looks than I usually feel
- ☐　　*Much better* about my looks than I usually feel
- ☐　　*A great deal better* about my looks than I usually feel

6. Right now I feel that I look...

- ☐ *A great deal better* than the average person looks
- ☐ *Much better* than the average person looks
- ☐ *Somewhat better* than the average person looks
- ☐ *Just slightly better* than the average person looks
- ☐ *About the same* as the average person looks
- ☐ *Justly slightly worse* than the average person looks
- ☐ *Somewhat worse* than the average person looks
- ☐ *Much worse* than the average person looks
- ☐ *A great deal worse* than the average person looks

Appendix H

RSES

Please indicate the appropriate number on the scale for each item, depending on whether you strongly disagree, disagree, agree, or strongly agree with it.

1	**2**	**3**	**4**
Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**

_____ 1.   I feel that I am a person of worth, at least on an equal plane with others.

_____ 2.   I feel that I have a number of good qualities.

_____ 3.   All in all, I am inclined to feel that I am a failure.

_____ 4.   I am able to do things as well as most people.

_____ 5.   I feel that I do not have much to be proud of.

_____ 6.   I take a positive attitude toward myself.

_____ 7.   On the whole, I am satisfied with myself.

_____ 8.   I wish I could have more respect for myself.

_____ 9.   I certainly feel useless at times.

_____ 10.   At times I think that I am no good at all.

Appendix I

Consent Form

University
of Windsor

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Frequency of Exercise Participation and its Relationship to Personality in Women.

You are asked to participate in a research study conducted by Ian Bishop and supervised by Dr. Ken Cramer, from the Psychology Department at the University of Windsor. The results will contribute toward Ian Bishop's Master's thesis.

If you have any questions about the research, please feel free to contact Dr. Ken Cramer at 519-253-3000, ext. 2218, or via email at kcramer@uwindsor.ca.

PURPOSE OF THE STUDY

The purpose of this study is to better understand the relationship between exercise frequency and personality in women.

PROCEDURES

If you volunteer to participate in the study we would ask you to do the following things: First, visit a website at which point you will create your own unique password. This password will allow you to return to the survey without losing your previous responses, in case you want to take a break, or accidentally close the survey. Second, provide some demographic information about yourself, such as age and ethnicity. Third, complete the online questionnaires, which should take about 20 minutes. Fourth, provide us with a valid email address at which to contact you in the event that you win a prize. The email address you provide will be stored separately from the information you enter into the survey and cannot be connected in any way to your answers.

POTENTIAL RISKS AND DISCOMFORTS

During the study you will be asked questions of a personal nature. These questions may bring up certain thoughts or feelings for you that you are not comfortable with. In the unlikely event that you experience distress through your participation in this study there are resources that you can contact. In Canada you can contact the Canadian Mental Health Association at either 613-745-7750 or http://www.cmha.ca. In the United States, you can contact Mental Health America at either 1-800-969-6642 or http://www.nmha.org.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

The benefits to participants in this study are to learn more about psychological research through participation, and to contribute to a greater understanding of the relationship exercise frequency has to personality in women.

PAYMENT FOR PARTICIPATION

In return for your participation you will have the option of being entered into a draw to win one of four $50 gift cards from Amazon.ca or Amazon.com. You will only be contacted if you win a prize, and you will be contacted via the email address you provide at the end of the survey. The email will instruct you on how to claim your prize.

CONFIDENTIALITY

You will not be personally identified on any of the questionnaires you complete. All of the data collected will be stored in a password-protected file, of which only the researcher in this study has access. Email addresses will be destroyed upon completion of the study. The information you provide may eventually be turned into a published research article. You will not be personally identified in any way in such an article, or in any subsequent article using your information.

PARTICIPATION AND WITHDRAWAL

You must be 18 or older, female, and live in either Canada or the United States to participate. You can choose whether or not to participate in this study. If you volunteer to be in this study, you may withdraw at any time. You also may refuse to answer any questions you do not want to answer and still remain in the study. However, **if you finish less than 90% of the survey, you will not be eligible for the draw for a prize unless you email the researcher at bishopi@uwindsor.ca with the subject line: "I wish to be entered in the draw;"** this also provides your email address which will be used to contact you in the event that you win a prize. If you wish to still be considered for a prize, it is not enough to simply leave the survey before completing it.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS

Following the completion of the study, a summary of the results will be posted at the following web address:

Web address: www.uwindsor.ca/reb
Date when results will be available: April 30th, 2010

SUBSEQUENT USE OF DATA

This data may be used in subsequent studies. The same confidentiality measures will be employed.

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation. This study has been reviewed and received ethics clearance through the University of Windsor Ethics Board. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4, Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

CONSENT OF RESEARCH PARTICIPANT/LEGAL REPRESENTATIVE

I understand the information provided for the study "Frequency of Exercise Participation and its Relationship to Personality in Women" as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given an opportunity to save or print a copy of this form (click here to download or print a PDF version of this form for your records, before agreeing to participate).

      □   I **DO** agree to participate in this research study

      □   I **DO NOT** agree to participate in this research study

Appendix J

Demographic Questionnaire

Age: _____   **You must be 18 or older!**
Sex: _____   **You must be female!**

Marital status:
Married/common law □   Divorced/separated □   Single □   Widowed □

Number of children: 0 □   1 □   2 □   3 □   4 □   more than 4 □

What is your ethnic background?
Caucasian   □   South Asian □   Hispanic   □
African descent   □   European   □   East Asian   □
American Indian or Aboriginal peoples in Canada   □
Other (please specify): _____

School enrolment:
Not a student   □   Part time student   □   Full time student   □

Years of education: _____

Currently, your employment status is:
Full time   □   Part time   □   Unemployed   □

If currently employed, your occupation is:
Clerical   □   Labourer   □   Owner/manager   □
Professional   □   Self-employed   □

The state or province that I currently reside in is:

Alberta	Florida	New Mexico
British Columbia	Georgia	New York
Manitoba	Hawaii	North Carolina
New Brunswick	Idaho	North Dakota
Newfoundland and	Illinois	Ohio
Labrador	Indiana	Oklahoma
Nova Scotia	Iowa	Oregon
Northwest Territories	Kansas	Pennsylvania
Nunavut	Kentucky	Rhode Island
Ontario	Louisiana	South Carolina
Prince Edward Island	Maine	South Dakota
Quebec	Maryland	Tennessee
Saskatchewan	Massachusetts	Texas
Yukon	Michigan	Utah
Alabama	Minnesota	Vermont

Alaska	Mississippi	Virginia
Arizona	Missouri	Washington
Arkansas	Montana	West Virginia
California	Nebraska	Wisconsin
Colorado	Nevada	Wyoming
Connecticut	New Hampshire	
Delaware	New Jersey	
District of Columbia		

Table 1

Correlations Between All Predictor and Outcome Variables (N = 99)

Variable	1	2	3	4	5	6	7	8	9	10
1. Exercise dependence	--									
2. Health and fitness motivation	.495***	--								
3. Appearance and weight motivation	.411***	.103	--							
4. Stress and mood motivation	.587***	.578***	-.037	--						
5. Socializing motivation	.255*	.112	-.016	.314**	--					
6. Positive perfectionism	.359***	.097	.367***	.119	.124	--				
7. Negative perfectionism	.235*	-.101	.330***	.121	.149	.361***	--			
8. Body mass index	-.082	-.334***	.051	-.073	.010	-.045	.099	--		
9. Hours of exercise per week	.520***	.408***	.035	.426***	.136	.168	-.112	-.126	--	
10. Body Satisfaction	.076	.362***	-.258**	.192	.166	.197	-.221*	-.630***	.338***	--
11. Self-esteem	-.046	.158	-.086	-.005	.116	.211*	-.466***	-.111	.224*	.384***

Note. $*p \leq .05$. $**p \leq .01$. $***p \leq .001$.

Table 2

Descriptive Statistics and Internal Consistencies of Study Measures (N = 99)

Variable	Mean	SD	Cronbach's α
Exercise dependence	101.85	19.22	.845
Reasons for exercise (RE)-total	111.92	16.12	.832
RE-health and fitness motivation	5.37	.93	.865
RE-appearance and weight motivation	4.77	1.11	.875
RE-stress and mood motivation	4.72	1.22	.757
RE-socializing motivation	2.37	1.17	.671
Positive perfectionism	75.91	9.08	.862
Negative perfectionism	55.49	12.60	.906
Body satisfaction	32.55	10.40	.896
Self-esteem	31.69	5.08	.904
Body mass index	24.20	4.60	-
Hours of exercise per week	5.04	3.92	-

Note. The RE-subscale means and standard deviations were derived from the subscale means for each participant.

Table 3

Summary of Mediation Analysis Between Exercise Dependence and Positive

Perfectionism by Health and Fitness Motivation (N = 99)

Mediation Steps	*B*	*SE B*	*β*
Step 1			
X predicts Y	.170	.045	.359***
Step 2			
X predicts M	.024	.004	.495***
Step 3			
M predicts Y while controlling for X	-1.046	1.069	-.107
Step 4			
X predicts Y while controlling for M	.195	.052	.412***

Note. X = exercise dependence, M = health and fitness motivation, Y = positive

perfectionism

*p ≤ .05. **p ≤ .01. ***p ≤ .001.

Table 4

Summary of Mediation Analysis Between Exercise Dependence and Positive

Perfectionism by Appearance and Weight Motivation (N = 99)

Mediation Steps	*B*	*SE B*	*β*
Step 1			
X predicts Y	.170	.045	.359***
Step 2			
X predicts M	.024	.005	.411***
Step 3			
M predicts Y while controlling for X	2.165	.827	.264**
Step 4			
X predicts Y while controlling for M	.118	.048	.250*

Note. X = exercise dependence, M = appearance and weight motivation, Y = positive perfectionism

*p ≤ .05. **p ≤ .01. ***p ≤ .001.

Table 5

Summary of Mediation Analysis Between Exercise Dependence and Negative

Perfectionism by Appearance and Weight Motivation (N = 99)

Mediation Steps	B	SE B	β
Step 1			
X predicts Y	.154	.065	.235[*]
Step 2			
X predicts M	.024	.005	.411[***]
Step 3			
M predicts Y while controlling for X	3.183	1.192	.280[**]
Step 4			
X predicts Y while controlling for M	.079	.069	.120

Note. X = exercise dependence, M = appearance and weight motivation, Y = negative

perfectionism

*p ≤ .05. **p ≤ .01. ***p ≤ .001.

Table 6

Summary of Hierarchical Regression Analysis for Variables Predicting Body

Satisfaction, Including Positive Perfectionism/Exercise Dependence Interaction

(N = 99)

Step and predictor variables	B	$SE\ B$	β	R^2	ΔR^2
Step 1				.422	.422***
Body mass index	-1.326	.167	-.587***		
Negative perfectionism	-.206	.066	-.249**		
Step 2				.482	.060**
Positive perfectionism	.312	.094	.272***		
Exercise dependence	-.009	.043	-.017		
Step 3				.503	.020
Positive perfectionism x exercise dependence	.007	.004	.144		

Note. Exercise dependence and positive perfectionism were centered at their means.

*$p \le .05$. **$p \le .01$. ***$p \le .001$.

Table 7

Summary of Hierarchical Regression Analysis for Variables Predicting Self-Esteem,

Including Positive Perfectionism/Exercise Dependence Interaction (N = 99)

Step and predictor variables	*B*	*SE B*	*β*	R^2	ΔR^2
Step 1				.217	.217***
Negative perfectionism	-.249	.035	-.617***		
Step 2				.386	.169***
Positive perfectionism	.255	.051	.455***		
Exercise dependence	-.017	.023	-.064		
Step 3				.386	.001
Positive perfectionism x exercise dependence	.000	.002	-.026		

Note. Exercise dependence and positive perfectionism were centered at their means.

*p ≤ .05. **p ≤ .01. ***p ≤ .001.

Table 8

Summary of Hierarchical Regression Analysis for Variables Predicting Body

Satisfaction, Including Negative Perfectionism/Exercise Dependence Interaction

(N = 99)

Step and predictor variables	*B*	*SE B*	*β*	R^2	ΔR^2
Step 1				.426	.426***
Body mass index	-1.340	.171	-.593***		
Positive perfectionism	.306	.097	.267**		
Step 2				.482	.057**
Negative perfectionism	-.212	.067	-.256**		
Exercise dependence	-.005	.045	-.010		
Step 3				.482	.000
Negative perfectionism x exercise dependence	.000	.003	.007		

Note. Exercise dependence and negative perfectionism were centered at their means.

*p ≤ .05. **p ≤ .01. ***p ≤ .001.

Table 9

Summary of Hierarchical Regression Analysis for Variables Predicting Self-Esteem,

Including Negative Perfectionism/Exercise Dependence Interaction (N = 99)

Step and predictor variables	B	$SE\ B$	β	R^2	ΔR^2
Step 1				.044	.044[*]
Positive perfectionism	.255	.051	.456[***]		
Step 2				.386	.341[***]
Negative perfectionism	-.248	.035	-.615[***]		
Exercise dependence	-.017	.023	-.064		
Step 3				.386	.000
Negative perfectionism x exercise dependence	-.000	.002	-.005		

Note. Exercise dependence and negative perfectionism were centered at their means.

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

Table 10

Partial Correlations for Each Predictor and Body

Satisfaction, Controlling for All Other Predictors (df = 89)

Predictor	β
Exercise dependence	-.160
Health and fitness motivation	.163
Appearance and weight motivation	-.306**
Stress and mood motivation	-.003
Socializing motivation	.218*
Positive perfectionism	.397***
Negative perfectionism	-.189
Body mass index	-.624***
Hours of exercise per week	.276**

Note. *$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

Table 11

Partial Correlations for Each Predictor and Self-Esteem,

Controlling for All Other Predictors (df = 89)

Predictor	β
Exercise dependence	-.194
Health and fitness motivation	.102
Appearance and weight motivation	.028
Stress and mood motivation	-.029
Socializing motivation	.226[*]
Positive perfectionism	.451[***]
Negative perfectionism	-.539[***]
Body mass index	-.005
Hours of exercise per week	.164

Note. *p ≤ .05. **p ≤ .01. ***p ≤ .001.

Figure Captions

Figure 1. Proposed path model: hypothesized mediations between exercise dependence and perfectionism type by exercise motivation; hypothesized moderation of the effect of exercise dependence on body satisfaction and self-esteem by perfectionism type.

Figure 2. The interaction between exercise dependence and positive perfectionism in the prediction of body satisfaction.

Figure 3. Final path model, following alterations, with standardized parameter estimates.
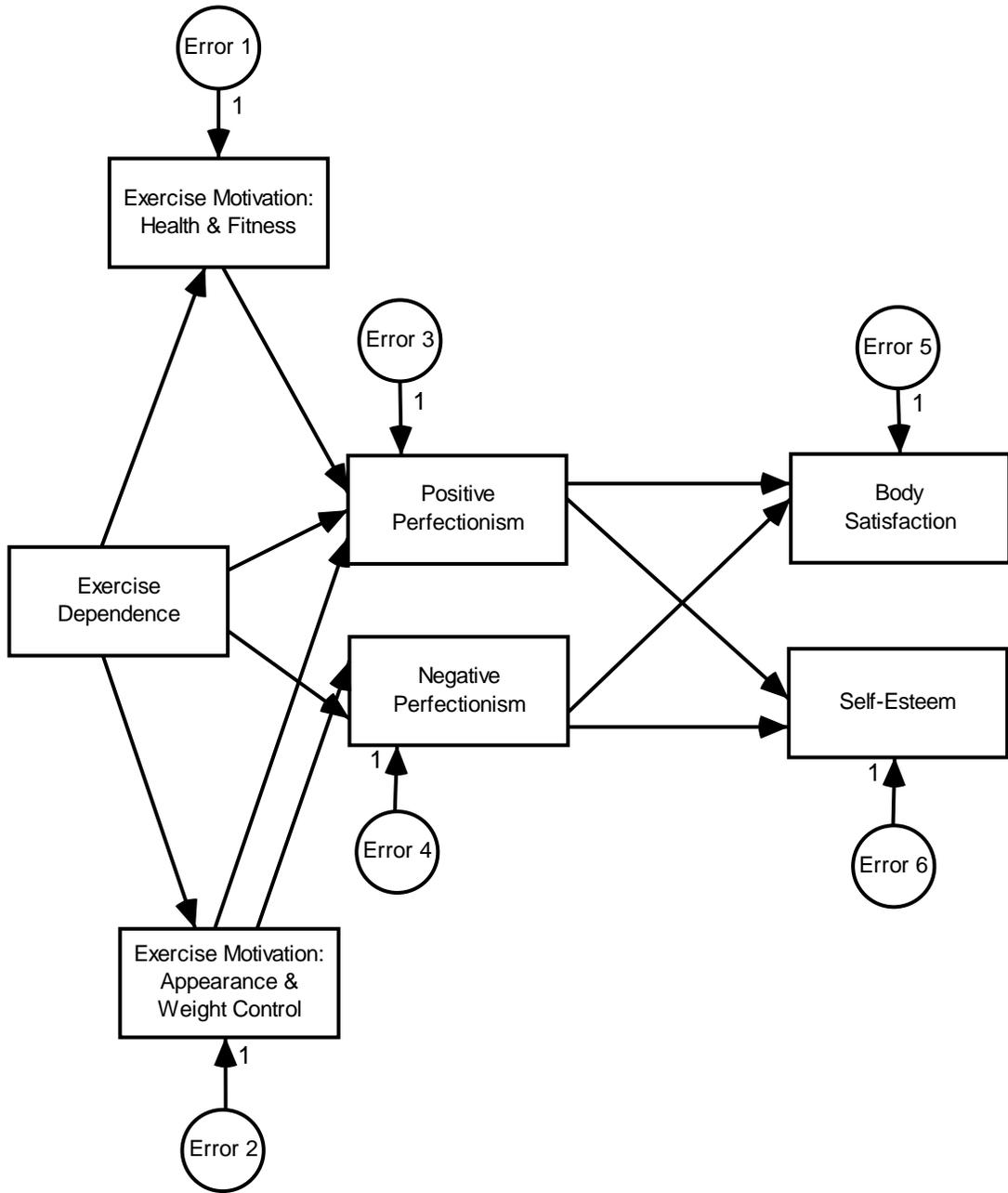
Figure 1

Figure 2

The Interaction between Exercise Dependence and Positive Perfectionism in the Prediction of Body Satisfaction

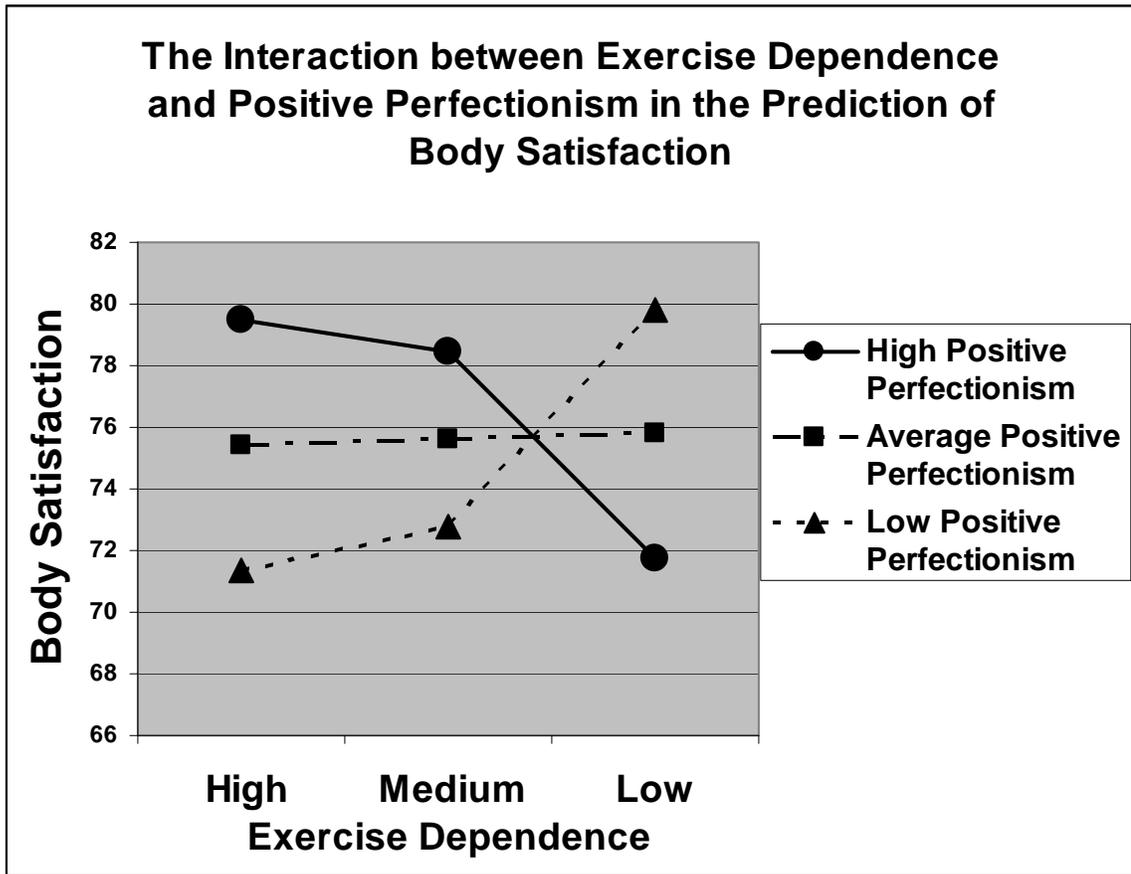Figure 3

VITA AUCTORIS
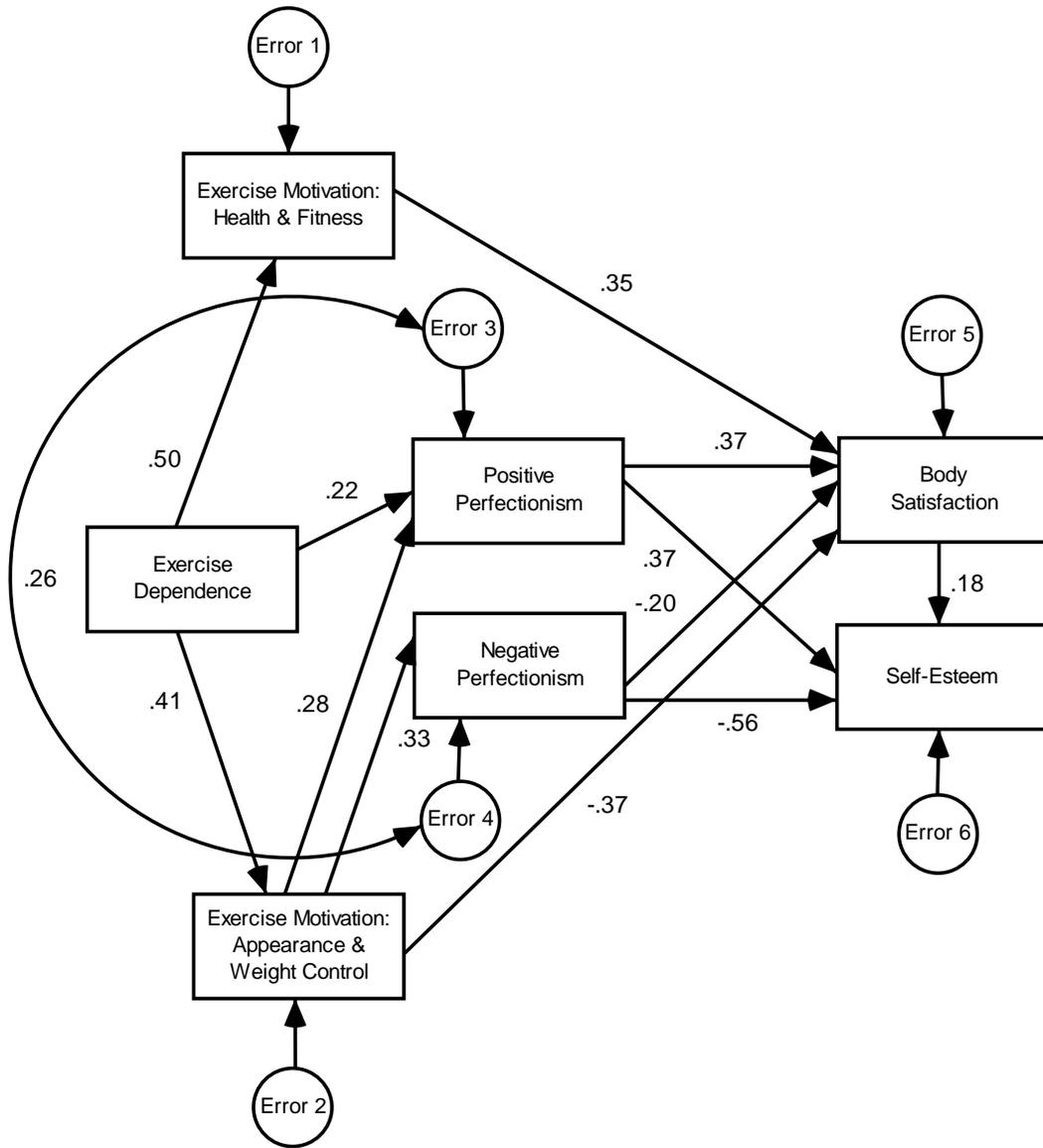
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