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Exercise dependence and body image in endurance athletes

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EXERCISE DEPENDENCE AND BODY
IMAGE IN ENDURANCE ATHLETES

A Master's Thesis presented to the Faculty of the
Graduate Program in Exercise and Sport Sciences
Ithaca College

In partial fulfillment of the requirements for the degree
Master of Science

by

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ABSTRACT

While the majority of Americans do not engage in enough exercise (CDC, 1995), some Americans exercise too much. When this occurs, exercise can be detrimental to an individual's health and well-being (Allegre, Souville, Therme, & Griffiths, 2006). This extreme exercise behavior, exercise dependence (ED; Hausenblas & Downs, 2002), can be observed in the general population; however, endurance athletes present a group of individuals who may experience higher levels of ED (Veale, 1987). The main purpose of this study was to determine the prevalence of ED in endurance athletes and examine the roles of gender, age, body image, and motives for physical activity. Participants were 218 endurance athletes ($N_{male} = 140$; $N_{female} = 78$), aged 19 to 83 years ($M = 38.76$; $SD = 12.18$). In addition to reporting amount of exercise, gender, age, and type of activity, participants completed the Exercise Dependence Scale-21 (Hausenblas & Downs, 2002), Body Self-Image Questionnaire (Rowe, Benson, & Baumgartner, 1999), and Motives for Physical Activity Measure (Ryan, Frederick, Leps, Rubio, & Sheldon, 1997). Findings indicated that 8.9% were nondependent and asymptomatic, 85.8% of the participants were symptomatic, and 5.3% were exercise dependent. Individuals in this sample reported exercising up to 40 hours per week ($M = 8.82$; $SD = 4.88$). Hours of exercise were related to ED ($r = .29$, $p < .01$) and competence and appearance based motivation (both $r = .21$, $p < .01$). ED was negatively related to age ($r = -.21$, $p < .01$) and positively related to enjoyment ($r = .26$, $p < .01$), competence ($r = .25$, $p < .01$), appearance ($r = .42$, $p < .01$), and fitness ($r = .21$, $p < .01$) based motives for physical activity. Further analysis indicated that 33% of the variance in ED was predicted by hours of exercise ($\beta = 0.12$, $p < .09$), running ($\beta = 0.17$, $p < .05$), biking ($\beta = -0.12$, $p < .09$), swimming ($\beta = 0.20$, p

<.01), enjoyment ($\beta = 0.15, p <.05$) and appearance ($\beta = 0.16, p <.09; F(9, 150) = 8.23, -$
 $p <.01$). These findings suggest that endurance athletes who participate in multiple
activities and exercise for appearance based motives may be at risk for ED.

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Chapter 1

INTRODUCTION

Exercise has shown tremendous value in both disease prevention and health promotion (Johnson, 1995). According to the Surgeon General (Galson, 2009), exercise can help reduce the risk for developing deadly diseases such as heart disease, diabetes, and high blood pressure and can prevent premature death from these illnesses. Incorporating physical activity into a daily routine is important because of the associated physical and psychological benefits that come with regular exercise. To achieve those health benefits, it is recommended that adults engage in at least 150 minutes of moderate intensity aerobic physical activity every week (Centers for Disease Control, 1995).

While the majority of Americans do not engage in nearly enough exercise (CDC, 1995), some people go to the opposite extreme and exercise too much. When this occurs, exercise can be quite dangerous and detrimental to an individual's health and well-being (Allegre et al., 2006; Bamber, Cockerill, Rodgers, & Carroll, 2003; Cox & Orford, 2004). Exercise behavior becomes negative when an individual starts experiencing significant dysfunction in the four major areas of his or her life: (1) psychological, (2) social and occupational, (3) physical, and (4) behavioral (Bamber et al., 2003). The term used to describe negative exercise behavior is exercise dependence (ED).

The prevalence of exercise dependence is not well-known. While only 6% of people within the general population exhibit symptoms of ED, it has been suggested that endurance athletes present a particular group of individuals who may experience higher levels of ED (Veale, 1987). Endurance athletes are known to use exercise as a means of improving performance. In addition, they often increase frequency and duration of

distance events, undergo intense training regimens, and ignore signs of injury (Adams & Kirkby, 1998; Johnson, 1995; Veale, 1987).

Purpose

The purposes of this study were to:

1. Describe the prevalence of ED in endurance athletes.
2. Examine the role of motivation and body image (BI) on ED in endurance athletes.
3. Determine the role of age and gender on ED in endurance athletes.
4. Identify main factors predicting ED in endurance athletes.

Hypotheses

There were six hypotheses for this study:

1. Motives for physical activity will be related to ED. Specifically, endurance athletes who exercise for appearance and enjoyment-based reasons will report higher levels of ED than athletes who do not exercise for appearance and enjoyment-based reasons.
2. Body image will be related to ED. Specifically, endurance athletes with negative body image will report higher levels of ED than athletes with positive body image.
3. Age will be related to ED. Specifically, younger endurance athletes will report higher levels of ED than older endurance athletes.
4. Gender will be associated with ED, BI, and motives for physical activity. Specifically, female endurance athletes who exercise for appearance-based reasons will report higher levels of ED than male endurance athletes.

5. There will be strong interaction effects between age, gender, and ED such that age and gender will represent the two moderator variables which influence the relationship between these variables and ED in endurance athletes.
6. Motives for physical activity and BI will be main predictors of ED in endurance athletes.

Assumptions of the Study

The following assumptions were made prior to the study:

1. Participants who choose to complete the survey will be similar to those who choose not to participate.
2. All participants will be honest when completing the online survey.
3. Some portion of participants will exhibit symptoms of ED.

Definitions of Terms

The following terms were operationally defined for the purpose of this study:

1. Exercise Dependence (ED) – physical activity which is extreme in frequency and duration, relatively resistant to change, and it is often associated with an irresistible impulse to continue exercise despite injury, illness, fatigue, or other personal demands (Hausenblas & Downs, 2002a).
2. Addiction – getting hooked on something so strongly that one becomes dependent on it (Johnson, 2000).
3. Body Image (BI) – an individual's subjective concept of his or her physical appearance (Forrest & Stuhldreher, 2007).
4. Body Image Dissatisfaction – dissatisfaction with one's physical appearance.

5. Body Image Distortion – discrepancy between one’s imagined and actual physical appearance (Leone, Sedoryt, & Gray, 2005).
6. Endurance Event – a distance event (up to twenty or more miles) of a prolonged duration.
7. Athlete – a sport participant who exhibits strong physical and psychological characteristics such as stamina, physical strength, muscular endurance, determination, and dedication to the sport.

Delimitations

The delimitations of this study were:

1. Endurance athletes of various ages in three particular endurance races in the Northeastern US were used as participants.
2. A voluntary response-based online survey was used to collect the data.
3. There could be factors other than BI, age, and gender which influenced ED in this group of endurance athletes.
4. Factors such as honesty and social desirability could influence participants’ answers to the survey questions.

Limitations

The limitations of this study were:

1. The results may only be generalized to endurance athletes.
2. Because the survey is a voluntary response-based, athletes who chose to not participate in the study may differ from athletes who chose to participate.
3. Factors other than BI, age, and gender may influence ED in this group of endurance athletes.

4. Factors such as honesty and social desirability may influence participants' answers to the survey questions.

Chapter 2

LITERATURE REVIEW

This section includes detailed review of the literature and is dedicated to (a) the benefits of exercise, (b) exercise dependence, and (c) the relationship between exercise and body image.

Benefits of Exercise

Regular exercise is an important aspect to a healthy lifestyle. Exercise plays an important role in disease prevention and treatment and it has shown to be a tremendous value in health promotion (Johnson, 1995). According to the Surgeon General, exercise can help reduce the risk for developing a deadly disease such as colon cancer, heart disease, and diabetes (Galson, 2009). Exercise also prevents premature death from some of the leading causes of illness in the United States such as high blood pressure and high cholesterol (CDC, 1995; Johnson, 2000). Regular physical activity helps maintain healthy bones and aides in weight control. Moreover, it helps to improve muscle tone, increase energy reserves, lower blood pressure, control cholesterol levels, relieve muscular stress, and promote restful sleep (CDC, 1995; Johnson, 2000). In addition to the physical benefits of exercise, regular physical activity is known to reduce feelings of anxiety and depression, build self-esteem, provide social opportunities, relieve stress, encourage setting and achieving of goals, and promote a sense of overall health and well-being (Johnson, 2000).

To achieve these health benefits, it is recommended that adults engage in 150 minutes of moderate aerobic physical activity every week (CDC, 1995). While 30 minutes of moderate physical activity 5 days a week provide health benefits, increasing

the duration of exercise to 60 minutes as well as its intensity can result in even greater health benefits (CDC, 1995). It is also suggested that adults weight train at least twice every week focusing on all major muscle groups (CDC, 1995).

Exercise Dependence

Positive exercise behavior may be observed when a person exercises according to the guidelines for physical activity, following exercise recommendations proposed by the Center for Disease Control and Prevention. This positive exercise behavior is often encouraged, unless a person starts exercising too much. When a person exercises too much, this positive behavior can become negative, affecting one's health and overall well-being.

Exercise as Negative Behavior

Although often viewed as a positive behavior, exercise can become dangerous and detrimental if taken to the extreme (Allegre et al., 2006; Bamber et al., 2003; Cox et al., 2004). Exercise dependence is a term used to describe exercise when it becomes an addiction, compulsion, or obsession and is defined as physical activity that is extreme in frequency and duration, relatively resistant to change, and is often associated with an irresistible impulse to continue exercising despite personal demands, fatigue, injury, or illness (Hausenblas & Downs, 2002a).

Exercise, as a negative behavior was first observed by Morgan (1979) in obligatory runners, those who described running as their "wonder" drug and felt an uncontrollable need to run despite any serious injury or illness. The obligatory runners claimed that running gave them feelings of euphoria, whereas the lack of activity made them feel anxious, depressed, and irritable (Allegre et al., 2006).

Hausenblas and Downs (2002b) furthered the idea of ED. In their study the researchers defined the participants' exercise behavior using three different categories: 1) at-risk or exercise dependent, 2) nondependent/symptomatic, and 3) asymptomatic. This work noted that there were many similarities found between ED and other addictive behaviors such as substance abuse and drug addiction (Hausenblas & Downs, 2002b). According to the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV), a classification system that provides diagnostic criteria for psychiatric disorders and other addictive behaviors (American Psychiatric Association, 1994), ED can be characterized by seven components which include but are not limited to withdrawal, tolerance, lack of control, intention effects, time, reduction in other activities, continuance, and, sometimes, relapse or re-occurrence of previous behavioral patterns (Allegre et al., 2006; Hausenblas & Downs, 2000).

Prevalence of Exercise Dependence

The prevalence of exercise dependence is not very well-known (Veale, 1987). According to past research, only 6% of people within the general population experience symptoms of exercise dependence (Adams & Kirkby, 1997; Veale, 1987), although more recent research examining college-aged students suggests that exercise dependence may be more prevalent in younger individuals. In an evaluation of commitment to physical activity in college students, Garman and colleagues (Garman, Hayduk, Crider, & Hodel, 2004) found that about 22% of the students reported an obligatory or pathological nature of their activity patterns. The students reported exercising up to 360 or more minutes per week and showed at least one exercise "dependent" response pattern (Garman et al., 2004). In addition, an examination of addictive behaviors in college-aged students, found

that alcohol consumption and exercise dependence appear to be the two prevalent health compromising behaviors (Martin, Martens, Serrao, & Rocha, 2008).

Theories of Exercise Dependence

Although the physiological and psychological reasons for ED are not the focus of the present research, there are five main theories that may help explain ED. The first theory is the β -endorphin theory of endogenous opioids which are the opiate-like substances produced by the body (Thoren, Floras, Hoffmann, & Seals, 1990). According to this theory, intense exercise stimulates ergoreceptors and leads to activation of the endogenous opioid system. Activation of the endogenous opioid system leads to the release of β -endorphins and catecholamines, adrenalin and noradrenalin hormones produced by the adrenal gland, into the blood stream and spinal fluid, resulting in increase in the pain threshold (Adams & Kirkby, 1998). This will cause an exercise dependent individual to increase intensity and duration of exercise sessions due to the increased pain tolerance.

The second theory for exercise dependence is the sympathetic arousal hypothesis theory (Thompson & Blanton, 1987). This theory proposes that exercise leads to tolerance of the release of adrenalin and noradrenalin, the hormones which are responsible for one's bodily functions and are produced in the time of physical or mental stress. According to Adams & Kirkby (1998) individuals who are exercise dependent require a greater duration or intensity of exercise to increase the concentration of those hormones in a blood stream to reach the same level of arousal.

The third theory for exercise dependence is the opponent-process model of addiction theory (Solomon, 1980). This theory looks at exercise dependence in

comparison to other addictions such as alcohol and drug addiction. Opponent-process model of addiction theory includes three phases. During the first phase an individual becomes familiar with the “drug” or addictive agent. The addictive “agent” affects the central nervous system which leads to the release of endorphins into one’s blood stream and an individual experiences the feeling of an emotional “high”. By phase two an individual develops tolerance. He or she needs to increase the dosage of this agent in order to experience the same effect. During phase three an individual stops pursuing the agent. He or she starts experiencing withdrawal symptoms which may vary from mild to extreme and are usually related to the amount of difficulty an individual experiences or the amount of effort her or she has to make without the drug or activity (Veale, 1991).

Another interesting theory for exercise dependence is the affect regulation hypothesis. According to this theory exercise can be viewed either as a “positive affect enhancer” or a “negative affect reducer” (Hamer & Karageorghis, 2007). A person can engage in exercise in order to decrease negative affect which can be defined as the feelings of anxiety and depression, or to increase positive affect such as increased energy reserves, vitality and drive (Lox, Martin-Ginis, & Petruzzello, 2003).

The anorexia analogue hypothesis theory is the final theory for exercise dependence, although it has not received much research support (Lox et al., 2010). This theory indicates that both exercise dependent persons and individuals with anorexia nervosa exhibit similar personality profiles such as tolerance for physical discomfort, anger, high self-expectations, denial of a serious problem, and depression (Yates, Leehey, & Shisslak, 1983). Individuals with anorexia engage in extreme dieting behaviors and

certain rituals to create a specific identity, the same way an exercise addict uses exercise to establish his or her sense of self (Coen & Ogles, 1993).

Primary vs. Secondary Exercise Dependence

Regardless of the underpinning physiology of ED, the expression of ED can be classified as primary or secondary. Primary exercise dependence exists independently and it is an end in itself (Allegre et al., 2006). A primary exercise dependent individual is not diagnosed with another mental or body image disorder (Bamber, Cockerill, Rodgers, & Carroll, 2003). He or she has a strong desire to continue exercising regardless of a serious physical disorder or an illness caused or aggravated by prolonged exercise (Allegre et al., 2006). Self-inflicted weight-loss is another important feature of primary exercise dependence, most commonly observed in athletes (Veale, 1987). Athletes are not concerned with their body shape *per se*, the weight loss is used purely as means of improving performance, especially in sports that place a great emphasis on leanness and where a low body weight puts a competitor at an advantage (Kerr, Lindner, & Blaydon, 2007). According to Kerr and colleagues sports that require athletes to maintain a thin-build figure to perform at their best have a tendency to put athletes at a greater risk for developing eating disorders, thus secondary ED (Kerr et al., 2007). These sports include endurance sports such as running, cycling, and cross country skiing; weight-dependent sports such as wrestling and martial arts; and aesthetic sports such as gymnastics or diving.

Compared to the primary exercise dependence, secondary exercise dependence implies cause and effect (Bamber et al., 2003). Secondary exercise dependence must have a reason for existence and is likely a consequence of another disorder (Allegre et al.,

2006). Secondary exercise dependence can be observed in individuals with eating disorders who use exercise to balance calories due to a strong fear of becoming obese (Veale, 1987).

Diagnostic Criteria for Exercise Dependence

Diagnostic criteria for primary and secondary exercise dependence are very similar and are based on a collection of symptoms and behaviors (Johnson, 1995). The difference in the diagnostic criteria between the two is that in primary exercise dependence exercise is perceived as an end in itself, whereas in secondary exercise dependence exercise is triggered by another disorder (Allegre et al., 2006; Bamber et al., 2003; Kerr et al., 2007; Veale, 1987). Regardless of ED type, exercise dependent individuals experience difficulties in at least two of the four major areas of health: psychological, social and occupational, physical, and behavioral. They are constantly thinking about exercise, and planning what he or she is going to do for a workout, when it will take place, and where it will happen.

Diagnostic criteria for ED are based on the DSM-IV criteria for substance abuse. These criteria include tolerance, withdrawal, intention effects, lack of control, time, reduction in other activities, and last but not least, continuance. According to Hausenblas and Downs (2002a), to be diagnosed with ED a person must meet at least three or more of these criteria.

The first criterion is *tolerance*. Tolerance can be defined by the need to increase the amounts of physical activity in order to obtain the same effects/benefits. The example of this can be an individual who starts off by exercising only once a day and increases the duration of the exercise sessions.

Second, *withdrawal* is a series of unpleasant physical or psychological consequences one goes through once exercise is stopped or reduced, which normally occur within 48-72 hours post exercise (Bamber et al., 2003). Some of the most common symptoms include: anxiety, irritability, insomnia, depression, guilt, fatigue, and loss of appetite (Allegre et al., 2006; Cox & Orford, 2004; Johnson, 2000; Veale, 1987). As time goes by, individuals with ED must increase the duration of their workouts in order to control those symptoms.

Third, the *intention effects* criterion can be defined by the desire to exercise for longer than it was primarily intended. For example, an individual who goes exercising for 30 minutes, but ends up extending the exercise session to an hour is a great example of this criterion.

Fourth, *lack of control* is presented by an inability for an exercise dependent person to control his or her exercise behavior. The exercise behavior eventually becomes stereotyped, creating problems in the behavioral aspect of the individual's life. Cox and colleagues (Cox & Orford, 2004) found lack of control on a day-to-day basis to be a common characteristic of exercise dependent individuals. Creating and following a specific routine helps those people feel in control of their lives because of the structure and predictability of exercise (Cox & Orford, 2004). These people have a set exercise schedule, which provides them with feelings of security and comfort. A person who takes multiple group exercise classes in a row cannot control their amount of physical activity.

The fifth criterion is *time*. Because exercise dependent individuals cannot control their exercise behavior, they often spend a great deal of time engaging in their favorite activity. These people may extend their exercise sessions and engage in multiple physical

activities a day. In addition, other activities are reduced or discontinued because exercise is a priority for an exercise dependent individual (Johnson, 2000). The social life of that person may suffer (Bamber et al., 2003). Exercise becomes more important than friends or family.

And last is *continuance*; the inability to stop exercise despite any recurring physical problems. Physical well-being of an individual becomes affected by the strenuous exercise regimen (Bamber et al., 2003). Because exercise dependent individuals are unable to decrease the amount of time spent exercising or the intensity of exercise routines, medical problems may arise as a consequence of that extreme exercise behavior. These persons are more likely to suffer increased injury and illness and ignore clinical advice and continue to exercise while injured or ill (Adams & Kirkby, 1998).

Measures of Exercise Dependence

Measuring exercise dependence is a difficult, although not impossible, task. Exercise dependence is measured through self-reported measures or questionnaires. The Exercise Dependence Scale-21 (EDS-21; Hausenblas & Downs, 2002b), Exercise Dependence Questionnaire (EDQ; Ogden, Veale, & Summers, 1997) and Obligatory Exercise Questionnaire (OEQ; Pasma & Thompson, 1988) are the most widely used measures to diagnose exercise dependence.

The EDS-21 is the newest measure of ED and evaluates the symptoms of exercise dependence based on the DSM-IV criteria for substance dependence (APA, 1994). EDS-21 presents and measures exercise dependence as a multidimensional maladaptive pattern of exercise that leads to clinically significant impairment or distress (Hausenblas & Downs, 2002b). The EDS-21 is a self-report 6-point Likert type scale with scores ranging

from from (1) “never” to (6) “always”. Higher scores of 5-6 fall under the dependent range; 3-4 are classified as symptomatic or at-risk for exercise dependence; 1-2 is a nondependent or asymptomatic range. The scale provides information about the overall mean score of exercise dependence symptoms and differentiates between a) those who are at-risk for exercise dependence, b) those who are nondependent-symptomatic, and c) those who are nondependent-asymptomatic. The scale specifies whether individuals have evidence of a) physiological dependence or b) no physiological dependence. With Cronbach’s $\alpha = 0.86$ for the total EDS-21, the scale demonstrates internal consistency (Hausenblas & Downs, 2002b). The subscales also demonstrate internally consistency; with coefficient alphas ranging from 0.78 to 0.92. The average variance extracted range from 0.78 to 0.95, and the weighted omegas range from 0.83 to 0.95 (Symons Downs, Hausenblas, & Nigg, 2004).

The EDQ is a 29-item, 8-factor self-report measure and it is relevant to all forms of exercise (Allegre et al., 2006). It examines motives to continue exercising based on fear of withdrawal symptoms, a desire to control weight and body shape, experiences of positive reward following exercise, and a drive for physical health (Ogden, Veale, & Summers, 1997). The EDQ presents exercise dependence symptoms that are similar to the symptoms of other addictive behaviors including interference with an individual’s family/social life and perceptions of low control. The EDS places ED within a continuum model of behavior (Ogden et al., 1997). The eight factors of the EDQ are (1) interference with social, family, and work life; (2) positive reward; (3) withdrawal symptoms; (4) exercise for weight control; (5) insight into problem; (6) exercise for social reasons (7) exercise for health reasons; and (8) stereotyped behavior (Ogden et al., 1997). Items are

scored on a 1-7 point Likert-type scale (Bamber, Cockerill, & Carroll, 2000). Individuals are considered exercise dependent if their scores on the EDQ are ≥ 116 . This scale provides good internal reliability for the factors: Interference with social, family, work life ($\alpha = 0.81$); Positive Reward ($\alpha = 0.80$); Withdrawal Symptoms ($\alpha = 0.80$); Exercise for Weight Control ($\alpha = 0.78$); Insight into Problem ($\alpha = 0.76$); Exercise for Social Reasons ($\alpha = 0.76$); Exercise for Health Reasons ($\alpha = 0.70$); and Stereotyped Behavior ($\alpha = 0.52$). The total EDQ score also has good internal reliability (Cronbach's $\alpha = 0.84$) (Ogden et al., 1997).

The OEQ examines the extent to which a person can be classified as an obligatory exerciser (Pasman & Thompson, 1988), and is modified from the Obligatory Running Questionnaire (Blumenthal, O'Toole, & Chang, 1984). The OEQ consists of 20 items which are rated on a 4-point Likert-type scale (never, sometimes, usually, and always). The scale shows the relationship between negative mood states and the inability to exercise when injured (Coen & Ogles, 1993). OEQ shows an excellent internal consistency, $\alpha = 0.96$, and test-retest reliability, $r = 0.96$ (Coen & Ogles, 1993).

All three scales have been used in previous research and present acceptable instruments for measuring exercise dependence (Coen & Ogles, 1993; Hausenblas & Downs, 2002b; Ogden et al., 1997; Pasman & Thompson, 1988). Although EDQ is relevant to all forms of exercise and OEQ shows the relationship between negative mood states and the inability to exercise, it appears that both questionnaires have no theoretical basis. Therefore, the EDS seems to be a better choice for this study for two main reasons. First, in comparison to EDQ and OEQ, EDS presents ED based on the DSM-IV criteria for substance abuse and other similar addictive behaviors. Second, in addition to

providing a range of ED scores, the EDS also differentiates between exercise dependent, nondependent/symptomatic, and asymptomatic classifications (Hausenblas & Downs, 2002b).

Motives for Physical Activity

There are many different motives people have for exercising and potentially over exercising. Ryan and colleagues (1997) examined people's motivation to exercise and differentiated between extrinsic and intrinsic motives for physical activity. Intrinsic motivation is a type of motivation that comes from within; it is internal in nature (Cox, 2007). People who are intrinsically motivated choose to exercise because they enjoy it, with a full sense of personal control (Cox, 2007). Extrinsically motivated individuals, on the other hand, are driven to exercise by some kind of external stimuli or rewards. Past research suggests that sports participants are more driven to exercise by the intrinsic motives such as enjoyment and competence, whereas fitness participants are extrinsically motivated and exercise primarily for fitness and appearance based reasons (Ryan et al., 1997).

Despite the fact that most people provide extrinsic reasons for exercising, intrinsic motivation plays a big role in exercise adherence (Ryan et al., 1997). Individuals often identify body-related motives as their primary reasons to start an exercise program (Allegre et al., 2006). Observing an improvement in individual's body shape and weight encourages one to continue exercising. This can lead to the development of secondary ED, as the individual continues exercising for appearance-based reasons. As the individual increases the amount of exercise, he or she also starts experiencing an increased tolerance for the release of adrenalin and noradrenalin hormones, which are

responsible for bodily functions and sympathetic arousal (Thompson & Blanton, 1987). The individual's motives change from extrinsic to intrinsic, and are mostly focused on personal interest or enjoyment and competence. The physical activity slowly becomes programmed (Ryan et al., 1997), while the individual is placed at risk for primary exercise dependence.

Body Image

Because there is a strong relationship between extrinsic motives and exercise, the concept of body image should be taken into the consideration when studying ED. Extrinsic motives reinforce one's engagement in physical activity due to the observed appearance-based physical benefits that come from regular exercise and improvement in body image (Johnson, 2000; Lox, Martin-Ginis, & Petruzzello, 2010). Body image can be defined by an individual's subjective concept of his or her physical appearance (Forrest & Stuhldreher, 2007). Regular physical activity was found to have a positive effect on one's physical appearance and, therefore, body image. In fact, previous research suggests that the primary reason most people engage in regular physical activity is to get in shape and improve their physiques and fitness levels (Allegre et al., 1996; Cox & Orford, 2004). Individuals who are extrinsically motivated to exercise engage in physical activity for appearance or body-related reasons. These people are not necessarily exercising for enjoyment or challenge; they exercise to improve their looks and body image.

Media and Social Influences

Human beings, in general, are very easily influenced. Two of the things that influence people the most are media (Hawkins, Richards, Granley, & Stein, 2004) and

society (Monteath & McCabe, 1997). Advertising agencies and movie-makers decide what people need and society tells them what to do in order to get what they need. When it comes to physical appearance, society chooses what the perfect bodies should look like by creating the “ideal”. These, so called, “ideals” are presented on the pages of various magazines – flawless with their toned bodies and perfect skin (Johnson, 2000). Media presents fashion models and celebrities who are all beautiful people with amazing bodies and are considered media ideals. The message sent by American culture is that image is important; it is believed that if you are considered to be attractive, you are guaranteed popularity (Johnson, 2000). To be popular, you have to look good, where looking good means having very little body fat percentage and muscles that are sculpted to perfection (Johnson, 2000). The media seems to be promoting a stricter and more defined image of an ideal body for women than men (Lox et al., 2010). Women are often being presented as slender and thin to emphasize their delicateness, whereas men should possess power and masculinity, therefore, appear muscular and strong (Butler & Ryckman, 1993; Furnham, Badmin, & Sneade, 2002). Although women are aware of the societal influences, most are unable to ignore the overwhelming pressure to be thin (Monteath et al., 1997). The research suggests that women who are exposed to the thin ideal images are more dissatisfied with their bodies, experience increased negative mood states, and have lower levels of self-esteem (Hawkins, Richards, Granley, & Stein, 2004). Compared to women with low self-esteem, women who have higher self-esteem are less likely to struggle with body image issues and are less likely to be concerned with their body weight (Posavac & Posavac, 2002). As opposed to men, generally, women are more

concerned with how society views them and display more commitment in pursuing the societal standard for a perfect body (Hawkins et al., 2004; Monteath et al., 1997).

Although women are usually the ones who appear to be concerned with their physiques, men can also be highly influenced by the media and society (Lox et al., 2010; Ousley, Cordero & White, 2008a; Watkins, Christie, & Chally, 2008). Male models seem to become more muscular each year (Grieve, 2007). The emphasis is not placed on leanness of a body anymore, but purely on muscle mass. For men, the goal is to gain muscle to obtain a mesomorphic societal ideal of a male body (Butler et al., 1993). The research suggests that overweight and obese men report greater levels of negative body image and weight or shape concern than do the normal or underweight men (Watkins et al., 2008); though, underweight men are often the ones with a negative sense of self (Furnham et al., 2002).

The “Perfect” Body in Today’s World

In today’s world the old adage “you cannot be too rich or too thin,” would probably change to something more like “you cannot be too fit or too thin” (Johnson, 2000). It seems that people cannot devote enough time to working out and staying in shape. Many people strive for perfectly sculpted muscles that come from pumping iron and increasing repetitions on the weight machines, and males are not the only ones who spend time at the gym (Johnson, 2000). A muscular body was not considered an “ideal” for a woman in the early 1980’s (Johnson, 2000). During the 1980’s a perfect woman was a thin woman. Thinness was a symbol for control, power, and success (Marzano-Parisoli, 2001). Fat and excess weight, on the other hand, was seen as a proof of personal inadequacy and lack of will power (Marzano-Parisoli, 2001). These things have changed

in the last few years. Although before viewed as animalistic, insensitive and unintelligent, now muscles symbolize a correct attitude towards life (Marzano-Parisoli, 2001). Today women's desire for muscle tone has increased since the 1980's (Butler & Ryckman, 1993; Johnson, 2000). Women desire to be toned and accomplish muscular definition, but they want to stay thin and less muscular than men (Butler et al., 1993). On the other hand, men want to attain one of two body types – very lean or very big and muscular (Watkins et al., 2008). Research identifies mesomorphy as the most important component of the ideal physique for both men and women (Butler & Ryckman, 1993).

The ultimate goal of achieving an ideal body seems to be the dream of many people. In this sense, our bodies are simple “objects” that can be built and modified (Marzano-Parisoli, 2001). If you are able to take control of your own body, you can shape and gain control of your life (Marzano-Parisoli, 2001).

Gender Differences in Body Dissatisfaction

Previous research suggests that people have a healthy body image if they experience positive feelings towards their body shape and size and behave in ways that reflect those positive feelings. Both, feeling negatively about the body and expressing a desire to hide or change the appearance indicate a body image disturbance (Lox et al., 2010). Body image disturbance is observed in two ways: body dissatisfaction and body distortion, and is becoming more prevalent among the general population (Forrest & Stuhldreher, 2007; McDonald & Thompson, 1992; Silberstein, Striegel-Moore, Timko, & Rodin, 1988; Wharton, Adams, & Hampl, 2008). Body dissatisfaction is primarily related to the intrapersonal factors that lie within the individual (Forrest & Stuhldreher, 2007). Body distortion, on the other hand, is closely related to the factors that surround the

individual -- interpersonal factors (Forrest & Stuhldreher, 2007). Although seen as two different concepts, body dissatisfaction and body distortion are closely correlated (Forrest & Stuhldreher, 2007). An individual can be dissatisfied with his or her body as a whole or with certain parts of the body only. Individuals who are more dissatisfied with their bodies are more likely to have a distorted body image and vice versa. It has been said that generally women are the ones who experience greater body dissatisfaction than men (Lox et al., 2010); however, distorted body image and body dissatisfaction appears to be quite prevalent in the male population as well (Ousley et al., 2008b; Watkins et al., 2008). The research suggests that women dislike only certain parts of their body such as hips, buttocks, thighs, or abdominal area; they want to achieve either an ultra-thin, shapely Western culture's ideal for a female body or a toned mesomorphic build for a "perfect" body in today's world (Butler & Ryckman, 1993; Lox et al., 2010; Silberstein et al., 1988). Men on the other hand, evaluate their bodies as a whole, expressing dissatisfaction with their upper bodies the most; back, chest, and arms (Silberstein et al., 1988). The male standard is the V-shaped physique: broad muscular shoulders, a narrow waist, muscular legs, and toned "six-pack" abdominal muscles; they want to increase muscle mass and decrease body fat to achieve that ideal (Lox et al., 2010).

The way a man and a woman perceive their body shapes is also different (McDonald et al., 1992; Silberstein et al., 1988). Men often perceive their bodies as being smaller than the actual size and women see themselves as being considerably larger than the actual size (McCaulay, Mintz, & Glenn, 1988). Thus, females are typically concerned with being too fat, whereas men express dissatisfaction with being too fat, too thin, too scrawny, or a combination of all three (Lox et al., 2010). Men and women who suffer

from distorted body image and are dissatisfied with their bodies are more likely to use inappropriate weight loss strategies than those with an accurate body image perception (Wharton et al., 2008).

Summary

Exercise is very important for individual's health and well-being because of the associated health benefits that come from regular physical activity. Some of the physical benefits include weight loss, improved cardiovascular fitness and muscular endurance, and psychological such as feelings of personal satisfaction and achievement. To achieve these benefits, an individual must engage in a minimum 150 minutes of moderate intensity aerobic physical activity a week as recommended by CDC.

While exercising to meet the proposed recommendations for physical activity is considered a positive exercise behavior, if a person exercises too much, this positive behavior becomes negative. The term used to describe negative exercise behavior is exercise dependence (ED). It has been suggested in previous research that about 6% of people within the general population exhibit symptoms of ED.

ED has been studied for quite some time. In fact, there are several theories that explain ED. These theories include: 1) the β -endorphin theory of endogenous opioids, 2) the sympathetic arousal theory, 3) the opponent-process model of addiction, 4) the affect regulation hypothesis, and 5) the anorexia analogue hypothesis. As ED attracted more interest among researchers, it became apparent that there were two types of ED, primary and secondary. Primary ED is observed in individuals who are driven to exercise despite any recurring medical problems or serious illnesses. These individuals are not diagnosed with a mental or body image disorder. Secondary ED must have a reason for existence. It

is often observed in individuals with eating disorders who exercise to balance calories due to a strong fear of gaining weight.

ED can be diagnosed based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria for addiction which include: 1) tolerance, 2) withdrawal, 3) intention effects, 4) lack of control, 5) time, 6) reduction in other activities, 7) continuance. In research presence of ED can be assessed through self-reported measures or questionnaires. Some of the well-known measures of ED include: Exercise Dependence Scale-21 (EDS-21), Exercise Dependence Questionnaire (EDQ), and Obligatory Exercise Questionnaire (OEQ).

So why do people exercise? Mainly, people exercise to improve their physical appearance and create a specific body shape. As it was suggested by Ryan et al. (1997), exercising for appearance-based reasons represent extrinsic motivation. Because there seems to be a strong connection between ED and appearance, it is important to consider a concept of body image when studying ED. Body image concerns seem to be apparent among both, males and females, although, females tend to express a higher dissatisfaction with their physiques.

Chapter 3

METHODS

This section describes the methodology of this study. It includes (a) the participants and procedures, (b) measures, and (c) data analyses.

Participants and Procedures

Participants were 218 endurance athletes ($N_{male} = 140$; $N_{female} = 78$), aged 19 to 83 years old ($M = 38.76$; $SD = 12.18$). Out of the 218 participants, 92% were Caucasian, 4% classified themselves as mixed ethnicities, 2% were Hispanic, and the rest of participants classified themselves as Other.

Participants were recruited from three endurance races, the Megatransect, the Can Lake Ultramarathon and 50K, and the Tussey Mountainback. The race directors for each of the three races were contacted via email to seek permission to conduct the study. After the Ithaca College Human Subjects Review Board approved the study, participants received an email from the race directors which included a detailed description of the study, an informed consent form for their records, requirements for the study, and a link to the online survey.

The Megatransect, a 40K endurance ultrahike challenge takes place in Lock Haven, Pennsylvania. The course is designed to challenge well trained endurance athletes as well as recreational hikers. During the event participants experienced total vertical gains over 5,000 feet. The key for the participants of this event is not to race the course but to finish it strong. There were 79 athletes who indicated that they completed the Megatransect.

The Can Lake Ultramarathon and 50K are a part of the Western New York Ultramarathon series. Participants of the ultramarathon complete a 50-mile road loop around Canandaigua Lake. The loop is mostly flat with some challenging rolling hills. The 50K route is significantly flatter which makes it easier for the first time participants. Total of 48 participants indicated that they competed in the Can Lake 50-mile race and 50K, both races combined.

The Tussey Mountainback is an ultramarathon and 50-mile relay which takes place in Boalsburg, Pennsylvania. Both races were held on an USA Track and Field certified ultramarathon championship course. Participants completed a 50-mile single loop through central Pennsylvania Rothrock State Forest. The course is mostly unpaved, 74% dirt, 26% paved, with the total change in elevation of 5,035 feet. 85 participants indicated that they completed the Tussey Mountain ultramarathon and relay races.

There was an overlap between the races with 9 participants indicating they completed both the Megatransect and Tussey. Six athletes did not report which race they completed.

Measures

Participants completed a short demographic questionnaire assessing their age, gender, ethnicity, hours they spend exercising, and types of physical activity. In addition, athletes were asked to complete three questionnaires assessing body image, exercise dependence, and motives for physical activity.

Body Self-Image

To assess athletes' perception of their bodies, the 27-item Body Self-Image Questionnaire (BSIQ; Rowe, Benson, & Baumgartner, 1999) was administered. The

BSIQ consists of 9-factors: Overall Appearance Evaluation (e.g., “My body looks good”), Fatness Evaluation (e.g., “I wish I were thinner”), Health/Fitness Evaluation (e.g., “My body is strong”), Negative Affect (e.g., “Most days I feel bad about my body”), Health/Fitness Influence (e.g., “How well my body is functioning influences the way I feel about my body”), Social Dependence (e.g., “I’m more aware of my body when I’m in social situations”), Investment in Ideals (e.g., “A well-proportioned body would be ideal”), Attention to Grooming (e.g., “I’m usually well-groomed”), and Height Dissatisfaction (e.g., “I wish I were a different height”). Participants responded to questions on a 5-point Likert-type scale with the scores ranging from (1) “*not at all true of myself*”, to (5) “*mostly true of myself*”. The BSIQ has demonstrated acceptable internal consistency for the subscales with Cronbach’s alphas ranging from $\alpha = 0.68$ to $\alpha = 0.92$ (Rowe et al., 1999). The BSIQ has also demonstrated good factorial validity and has been cross-validated (Rowe, 2005).

Exercise Dependence

The Exercise Dependence Scale-21 (EDS-21; Hausenblas & Downs, 2002) was used to assess presence of exercise dependence. The EDS-21 is a self-report 6-point Likert-type scale ranging from (1) “*never*” to (6) “*always*.” The EDS-21 is comprised of seven subscales reflecting the DSM-IV criteria for addiction: Tolerance (e.g., “I continually increase my exercise intensity to achieve the desired effects/benefits”), Withdrawal (e.g., “I exercise to avoid feeling irritable”), Intention Effect (e.g., “I exercise longer than I intend”), Lack of Control (e.g., “I am unable to reduce how long I exercise”), Time (e.g., “I spend a lot of time exercising”), Reduction in Other Activities (e.g., “I think about exercise when I should be concentrating on school/work”), and

Continuance (e.g., “I exercise despite recurring physical problems”). For each of the subscales, higher scores of 5-6 fall under the dependent range; 3-4 are classified as symptomatic or at-risk for exercise dependence; and 1-2 is a nondependent or asymptomatic range. An individual is classified as exercise dependent if three or more DSM-IV criteria for dependence are met. The scale provides the mean overall score of exercise dependence symptoms and differentiates between at-risk for exercise dependence, nondependent-symptomatic, and nondependent-asymptomatic categories. The scale also specifies whether individuals have evidence of a) physiological dependence or b) no physiological dependence. EDS-21 is internally consistent, valid, and reliable with Cronbach’s alphas ranging from 0.78 to 0.92, the average variance extracted from 0.78 to 0.95, and the weighted omegas from 0.83 to 0.95 (Downs, Hausenblas, & Nigg, 2004).

Motives for Physical Activity

Participants completed the Motives for Physical Activity Measure (MPAM-R; Ryan, Frederick, Lepas, Rubio, & Sheldon, 1997), a 30-item, 5-factor scale to assess various motives people have for exercising. Participants rated their answers on the 7-point Likert-type scale with responses varying from (1) “*not at all true for me*” to (7) “*very true for me.*” The (5) factors are: Fitness (e.g., “I exercise because I want to be physically fit”), Appearance (e.g., “I exercise because I want to define my muscles so I look better”), Competence/Challenge (e.g., “I exercise because I like physical challenges”), Social (e.g., “I exercise because I want to be with my friends”), and Enjoyment (e.g., “I exercise because it makes me happy”). The MPAM-R has shown

good internal consistency for the subscales; Cronbach's alphas range from 0.78 to 0.92 (Ryan et al., 1997).

Data Analysis

Predictive Analytic Software (PASW) 17.0 statistical program was used to analyze the data. First, the Cronbach's alphas were calculated to determine validity and reliability of the scales and subscales used in this study. Next, the descriptive statistics were run to examine the prevalence of ED, the amount of hours athletes spent exercising, and types of physical activity.

The strength of relationships between the variables in this study was examined through Pearson correlation analyses. All variables in the study were analyzed with Pearson correlations to determine most significant relationships.

To assess gender differences in ED, BI, and motives for physical activity three independent *t*-tests were conducted. In all three independent *t*-tests ED, BI, and motives for physical activity represented dependent variables and gender represented an independent variable.

Following a series of independent *t*-tests, a 2 (gender) by 4 (age group) two-way ANOVA was conducted to examine the interaction effects between age, gender, and ED. Age and gender were represented as the two independent moderator variables which influenced their relationship with the dependent variable, ED. For this particular analysis, participants were divided into four age categories. The four age groups were created as follows: (1) 19-34 years old; (2) 35-50 years old; (3) 51-66 years old; and (4) 67-83 years old. Participants were split into such categories to ensure there were an equal number of individuals in each group.

This analysis was followed by a stepwise multiple regression analysis to examine significant predictors of ED. The backward stepwise approach involves testing all independent variables for their statistical significance. The variables with non-significant statistical parameters are automatically removed from the equation, and the equation then re-estimated (Miles & Shevlin, 2001). The final product is a parsimonious model which explains the most variance in the dependent variable and contains the fewest number of independent variables (Miles & Shevlin, 2001). Alpha was set at .05 for all the data analyses.

Chapter 4

RESULTS

Almost all scales used in this study were internally consistent with Cronbach's alphas of the full scales ranging from .77 to .91, showing that the scales were valid and reliable measures (Cronbach, 1970). Cronbach's alphas for three of the subscales of BSIQ (Health-Fitness Influence, Investment in Ideals, and Attention to Grooming) and one of the subscales of EDS (Reduction in Other Activities) fell below .70, which suggest that they may not be internally consistent. Although in the BSIQ and EDS several subscales exhibited low reliability, it did not affect the results of this study because overall scale scores were used. Descriptive statistics for all the scales and subscales are presented in Table 1.

Descriptive Statistics

Table 2 presents the descriptive statistics on the prevalence of ED in this sample of endurance athletes. The results indicated that 8.9% of athletes were asymptomatic, 85.6% were symptomatic, and 5.3% were exercise dependent. Participants reported spending between two and 40 hours per week exercising ($M = 8.82$; $SD = 4.88$). The main types of activities athletes utilized included running (94%), biking (50%), swimming (20.6%), and weight lifting (53.2%); 36.2% acknowledged that they engaged in other types of training.

Table 1
Descriptive Statistics for Scales and Subscales

Scale	Subscale	Mean (<i>M</i>)	Standard Deviation (<i>SD</i>)	Cronbach's Alpha (α)
BSIQ		83.53	10.76	.77
	OAE	11.30	2.21	.80
	HFI	12.97	1.79	.58
	II	11.19	2.35	.63
	HFE	12.78	2.01	.84
	AG	9.30	2.41	.69
	HD	6.15	3.40	.87
	FE	6.53	3.55	.87
	NA	5.13	2.64	.87
EDS	SD	8.20	2.75	.71
		64.58	15.24	.90
	WD	11.28	3.59	.84
	CON	9.50	3.57	.82
	TOL	11.63	3.17	.87
	LC	7.16	3.30	.86
	RED	7.05	2.57	.64
	TIME	9.97	3.27	.85
	INT	7.70	3.13	.92
MPAM		165.29	20.60	.91
	ENJ	48.16	5.73	.83
	COMP	41.25	5.58	.85
	APP	29.11	7.65	.90
	FIT	31.08	3.39	.80
	SOC	20.87	6.86	.86

Note. BSIQ = Body Self-Image Questionnaire; OAE = Overall Appearance Evaluation; HFI = Health/Fitness Influence; II = Investment in Ideals; HFE = Health/Fitness Evaluation; AG = Attention to Grooming; HD = Height Dissatisfaction; FE = Fatness Evaluation; NA = Negative Affect; SD = Social Dependence; EDS = Exercise Dependence Scale; WD = Withdrawal; CON = Continuance; TOL = Tolerance; LC = Lack of Control; RED = Reduction in Other Activities; TIME = Time; INT = Intention Effects; MPAM = Motives for Physical Activity Measure; ENJ = Enjoyment; COMP = Competence; APP = Appearance; FIT = Fitness; SOC = Social.

Table 2
Prevalence of ED in Endurance Athletes

	Male	Female	Total
ED	5.7%	4.4%	5.3%
SYMP	86.1%	85.3%	85.8%
NON-ED/ASYMP	8.2%	10.3%	8.9%

Note. ED = Exercise Dependent; SYMP = Symptomatic; NON-ED/ASYMP = Non-Exercise Dependent/Asymptomatic

Pearson Correlations

To further describe the relationship between ED, BI, and motives for physical activity, multiple correlation analyses were conducted. Prior to the study it was hypothesized that motives for physical activity and BI would be related to ED. All variables in the study were correlated to each other to determine the most significant relationships. Results revealed that hours of exercise ($r = 0.29, p < .01$), running ($r = 0.16, p < .05$), swimming ($r = 0.15, p < .05$), and lifting ($r = 0.14, p < .05$) all had small but significant effects on overall ED scores, suggesting that athletes who spent many hours exercising and participated in running, swimming, and lifting were more likely to exhibit symptoms of ED. Overall, ED score was negatively related to age ($r = -0.21, p < .01$), indicating that younger athletes were at more risk for ED than older athletes; though the effect was small. Enjoyment ($r = 0.26, p < .01$), competence ($r = 0.25, p < .01$), appearance ($r = 0.42, p < .01$), and fitness-based motives ($r = 0.21, p < .01$) were all positively related to the overall ED scores and had small to moderate effects on ED. Motives for physical activity all had small to moderate effects on overall ED scores. Enjoyment, competence, appearance, and fitness-based motives for physical activity all had small to moderate effects on overall ED scores. These findings suggest that enjoyment, competence, appearance, and fitness all contributed to athletes' motivation to exercise. BI was positively related to overall ED scores and had small effects on ED ($r = 0.30, p < .01$), suggesting that athletes with positive body image were at more risk for ED. Appearance-based motives had a moderate effect and was positively related to BI ($r = 0.62, p < .01$), indicating that athletes who exercised for appearance-based reasons had a more positive body image. Additionally, appearance-based motives were positively

related to hours of exercise ($r = 0.21, p < .01$) and negatively related to age ($r = - 0.20, p < .01$). These findings show that younger athletes who were driven to exercise by appearance-based motives were likely to spend many hours exercising and exhibit symptoms of ED. A full correlation table is provided in Appendix F.

Independent *t*-Tests

Prior to the study it was hypothesized that gender would be associated with ED. However, there were no significant gender differences in the overall ED score ($t(188) = 1.13, p = .26$). Significant gender differences were found between the scores of the withdrawal subscale ($t(205) = 2.68, p < .01$) indicating the females ($M = 12.14; SD = 3.54$) were more likely to experience withdrawal symptoms than males ($M = 10.78; SD = 3.54$). Moreover, it was hypothesized that gender would be associated with BI and motives for physical activity. Significant differences were found between male and female athletes in the overall BI score ($t(198) = 4.75, p < .01$), indicating that female athletes ($M = 7.68; SD = 3.37$) were more likely to evaluate their bodies to be fatter ($t(210) = 3.71, p < .01$) than male athletes ($M = 5.86; SD = 3.50$). In addition, female athletes ($M = 12.14; SD = 1.20$) were more likely to be more invested in ideals ($t(208) = 4.72, p < .01$) than male athletes ($M = 10.63; SD = 2.36$). In addition, significant gender differences were found in the overall motives for physical activity ($t(183) = 3.34, p < .01$), specifically enjoyment ($t(199) = 2.72, p < .01$) and appearance-based motives ($t(205) = 2.99, p < .01$), suggesting that females ($M = 171.60; SD = 18.62$) were more likely to exercise to have fun and improve their looks than males ($M = 161.44; SD = 20.87$).

Two-Way ANOVA

It was hypothesized that there would be strong interaction effects between age, gender, and ED. The results from a two-way ANOVA indicated that there were no significant age and gender interaction effects on ED in this sample of endurance athletes (means and standard deviations for each group are provided in Appendix G). Results from two-way ANOVA are presented in Table 3.

Table 3
ANOVA Interaction Effects between Age and Gender

	η^2	$F(df)$	<i>Sig</i>
SEX	0.00	0.34(1)	.56
AGEGroup	0.03	2.10(3)	.10
SEX*AGEGroup	0.00	0.30(2)	.97

Multiple Regression

To examine the hypothesis that motives for physical activity and BI would be main predictors of ED, a stepwise multiple regression was run. The results from this multiple regression analysis revealed that 33% of the variance in ED was predicted by the type of training, hours of exercise, three subscales of BSIQ (overall appearance evaluation, health-fitness influence, and attention to grooming), and enjoyment and appearance, the two subscales of MPAM ($F(9, 150) = 8.23, p < .01$). Individual contributions of each variable are presented in Table 4.

Table 4
Multiple Regression Predictors of ED in Endurance Athletes

	B	Standard Error (SE)	Beta (β)
HoursEX	.38	.22	.12
RUN	10.77	4.39	.17*
BIKE	- 3.49	2.04	-.12
SWIM	7.09	2.55	.20**
OAE	-1.11	.48	-.17*
HFI	1.55	.67	.18*
AG	1.03	.45	.17*
ENJ	3.08	1.55	.15*
APPEAR	1.81	1.00	.16

Note. ** = $p < .01$; * = $p < .05$

HoursEX = Hours of Exercise; OE = Overall Appearance Evaluation; HFI = Health/Fitness Influence; AG = Attention to Grooming; ENJ = Enjoyment; APPEAR = Appearance.

Chapter 5

DISCUSSION

This study described the prevalence of ED and examined the role of BI in endurance athletes. Specifically, there were four main purposes of this study: 1) to describe the prevalence of ED in endurance athletes, 2) to examine the role of motivation and BI on ED in endurance athletes, 3) to determine the role of motivation and BI on ED in endurance athletes, and 4) to identify main factors predicting ED in endurance athletes. The first purpose of this study was to describe the prevalence of ED in endurance athletes, specifically, to identify how many participants would exhibit symptoms of ED. Participants in this study were all endurance athletes who engaged in a variety of physical activities and spent up to 40 hours per week exercising. Main types of physical activity included running, biking, swimming, and weight lifting. In terms of prevalence of ED in this group of endurance athletes, results indicated that the vast majority of participants exhibited symptoms of ED. These findings were consistent with the previous research which suggests that endurance athletes are individuals who may be at risk for ED as compared to the general population (Veale, 1987). According to previous research, endurance athletes are known to engage in intense training and increase frequency and the length of their endurance events (Adams & Kirkby, 1998; Johnson, 1995, Veale, 1987), which often leads to overtraining and injuries. Interestingly enough, additional research on ED indicates that runners present a group of athletes who often exhibit symptoms of ED (Morgan, 1979). This was confirmed by the findings of current study which indicated that running was the most common activity among this group of athletes.

Although the majority of athletes in this sample were classified as symptomatic, these findings cannot be generalized to the rest of the population and other recreational exercisers. This can be explained by the fact that participants in this study were endurance athletes who competed in long distance endurance events. These individuals greatly differ from the rest of the population and other recreational exercisers in their physical abilities. In addition, because the only events taken into the consideration were long distance endurance events such as ultramarathons and marathons, the findings of this study cannot be generalized to the events of short duration such as 5K and 10K races. Ultramarathons and marathons, both present very challenging events, not only requiring a great stamina and physical endurance, but also an incredible will power and determination.

The Role of Motivation and BI on ED in Endurance Athletes

The second purpose of this study was to examine the role of motivation and BI on ED in endurance athletes. It was hypothesized that motives for physical activity would be related to ED. Specifically, endurance athletes who exercise for appearance and enjoyment-based reasons would report higher levels of ED. The findings revealed that athletes in this sample were motivated by both enjoyment and appearance-based motives. They exercised to improve their physical appearance and fitness level, meet the challenge, and have fun. These findings indicate that extrinsic motivators such as appearance and fitness and intrinsic motivators such as competence and enjoyment are related to the development of ED symptoms in endurance athletes and possibly other physically active individuals. Findings of this study were consistent with previous research suggesting that one's motives for exercising can be either intrinsic or extrinsic in

nature (Ryan et al., 1997). Previous research suggests that one can be intrinsically motivated to exercise when he or she chooses to participate in the activity because the activity is fun and enjoyable, whereas extrinsic or body-related motives come into play when he or she observes improvements in his or her physical appearance. Extrinsic motives are motives that may drive an individual to start exercising, whereas intrinsic motives keep one coming back to the activity and develop consistency (Allegre et al., 2006; Ryan et al., 1997).

Many athletes in this study were competitive endurance runners who participated in a variety of endurance events. Other athletes may have been recreational exercisers who competed in endurance events as a part of a relay team and engaged in more fitness-related activities. According to Ryan and colleagues, individuals who compete in endurance and other sports are more intrinsically motivated, whereas people who engage in fitness related activities more are driven to exercise by extrinsic motives (Ryan et al., 1997). Looking at a bigger picture, the connection between extrinsic and intrinsic motives becomes more prominent. A person may start exercising strictly for extrinsic reasons. Body and appearance related improvements are a few physical benefits of regular exercise (Johnson, 2000). Therefore, it seems logical to believe that those benefits would be enough to drive one to continue exercising. As individual continues to exercise, his or her motives may shift from extrinsic to intrinsic. One would not necessarily exercise to achieve physical benefits, but instead to experience the feeling of an emotional “high” (Adams & Kirkby, 1998). As suggested by the opponent-process model of addiction, a person must increase the “dosage” of exercise to experience the same feeling (Solomon, 1980). As time goes by, individual starts scheduling more exercise

sessions into his or her daily routines, exercise becomes stereotyped (Ryan et al., 1997), while one may be placed in at-risk for ED category.

It was also hypothesized that BI would be related to ED. Specifically, endurance athletes who felt negatively about their bodies would report higher levels of ED than endurance athletes who felt positively about their bodies. Although the findings indicated that BI had a weak effect on ED, the relationship between BI and exercise was still meaningful, which indicates that one's BI can play an important role in his or her exercise habits. In addition appearance-based motives for physical activity had a moderate effect on BI, suggesting that athletes who exercised to improve their appearance had a more positive body image. Together these findings reveal that endurance athletes who were more pleased with their physical appearance exhibited symptoms of ED compared to athletes who were asymptomatic spent less time exercising. Although these findings did not support the original hypothesis, they were consistent with previous research on BI and exercise. Previous research suggests that body image is strongly associated with physical activity because through exercise one can improve his or her physical appearance through exercise and, therefore, body image (Johnson, 2000; Watkins et al., 1997). This can be explained by the affect regulation hypothesis theory of ED (Hamer & Karageorghis, 2007). This theory suggests that exercise is a "positive effect enhancer" and can help individual develop and sustain positive feelings towards one self. Thus, it is possible that athletes use exercise to decrease negative affect and improve their self-esteem.

The Role of Age and Gender on ED

The third purpose of this study was to determine the role of age and gender on ED in endurance athletes. First, it was hypothesized that that age would be related to ED. Specifically, younger endurance athletes would report higher levels of ED. Current findings supported the original hypothesis with a correlation between age and ED, which was consistent previous research on age and ED. Previous research shows that age is strongly associated with ED, suggesting that ED may be more prevalent in younger individuals (Garman et al., 2004). A study of college-aged students and their exercise behavior showed that 22% of the students exhibited pathological nature of their physical activity and exercised up to 360 or more minutes per week. Moreover, it was found that younger individuals are more prone to become addicted to exercise and other health compromising behaviors (Martin et al., 2008).

Next, it was hypothesized that gender would be associated with ED. In addition, it was believed that gender would be related to BI and motives for physical activity. Specifically, female endurance athletes would report higher levels of ED and would exercise for appearance-based reasons compared to male endurance athletes. Current findings were consistent with previous research on gender, BI, and exercise behavior. Although, both male and female endurance athletes seemed to be driven to exercise by appearance-based motives, females were more concerned about their physiques and desired to improve their looks. Previous research on gender, BI, and exercise behavior suggests that there is a very little difference in male and female exercise behavior targeted towards appearance improvement (Butler & Ryckman, 1993; Johnson, 2000). A muscular body was not ideal for a woman of 1980's (Johnson, 2000). In 1980's, women

strived to achieve an ultra-thin Western culture's ideal for a female body (Lox et al., 2010; Silberstein et al., 1988). Now women desire to be muscular and toned (Butler & Ryckman, 1993). For men, on the other hand, the emphasis was always placed purely on muscle mass to reveal their strength and masculinity (Butler & Ryckman, 1993; Furnham et al., 2002). Now muscles symbolize a correct attitude towards life as both males and females strive to "build" a mesomorphic societal ideal of a "perfect" body (Butler & Ryckman, 1993; Marzano-Parisoli, 2001). Thus, this desire for an ideal figure combined with intense exercise greatly affects individual's life, placing him or her in at-risk for ED category.

These findings appear to disclose another limitation of this study. Not all athletes participating in this study were true endurance athletes. It seems logical to believe that older athletes were not all competitive athletes and participated in endurance events for purely recreational reasons.

Age and Gender Interaction Effects on ED

Prior to the study it was hypothesized that there will be strong interaction effects between age, gender, and ED. It was believed that age and gender would represent the two moderator variables which would influence the relationship between age and ED, and gender and ED. Current findings did not support the original hypothesis. There were no significant interaction effects found between age, gender, and ED, suggesting that age and gender did not represent two moderator variables and did not influence the relationship between age and ED, and gender and ED. These findings can be attributed to the difference in the number of male and female athletes in this sample, as well as the fact that majority of participants fell within the 35-50 age range.

Predictors of ED

The final purpose of this study was to identify main factors predicting ED in endurance athletes. Specifically, it was hypothesized that motives for physical activity and BI would be main predictors of ED. The findings revealed that motives for physical activity, overall appearance evaluation, and health-fitness influence were all significant predictors of ED in this group of endurance athletes. Hours of exercise and type of training were also predictors of ED. In total 33% of variance in ED was explained by these variables. This can be explained by the fact that athletes use a variety of activities to train in order to compete in endurance events such as marathons and ultramarathons, thus spending many hours exercising. Moreover, to compete in such physically demanding events one must enjoy the activity and be fit. Overall, these findings support the original hypothesis and indicate that endurance athletes who spend many hours exercising, train using a variety of activities, and are extrinsically and intrinsically motivated may be at risk for ED. Current findings were consistent with previous research on ED and athletes. Previous research suggests that endurance athletes often increase the intensity of their training and duration of distance events, spending many hours exercising (Adams & Kirkby, 1998).

Although these findings were consistent with previous research, it must be acknowledged that the survey was a voluntary-response based. Therefore, only athletes who chose to participate in this study can be accounted for. Athletes who chose not to participate in this study may have provided different answers to the survey questions as compared to athletes who chose to participate. Moreover, there was no way to control for

social desirability. Athletes who completed the survey may have answered to certain questions with the hope to provide most desirable responses.

Chapter 6

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was conducted to examine ED and BI in a sample of endurance athletes. Specifically, there were four main purposes: 1) to describe the prevalence of ED, 2) to examine the role of motivation and BI on ED, 3) to determine the role of gender and age on ED, and 4) to identify main factors predicting ED. After running the data analyses and interpreting the results, it was found that endurance athletes present a group of individuals who may be at risk for ED. These individuals spend many hours exercising and use a variety of activities for training. Both male and female endurance athletes appear to be extrinsically and intrinsically motivated to exercise. There seems to be no apparent differences in ED between genders, however, younger athletes appear to be at more risk for ED than older athletes. In addition, females tend to show less satisfaction with their bodies and exercise to improve their physical appearance, while males are driven to exercise by enjoyment and competence-based reasons.

It is important for endurance athletes to become aware of their exercise motives. They must learn to recognize the differences between positive and negative exercise behaviors. Once endurance athletes become familiar with their motives for physical activity, they may re-evaluate their exercise behavior and establish new and improved motives for exercising.

Conclusions

From the findings of this study it was possible to conclude the following:

1. Endurance athletes who exercised for appearance and enjoyment-based reasons were slightly more at risk for ED.
2. Athletes who felt positively about their bodies were slightly more at risk for ED.
3. Younger athletes were slightly more at risk for ED than older athletes.
4. Female athletes were driven to exercise by appearance-based motives, while male athletes were exercising for enjoyment and competence-based reasons.
5. Factors such as overall appearance evaluation, health-fitness influence, attention to grooming, appearance and enjoyment-based motives, hours of exercise, and type of activity were all predictors of ED in this group of endurance athletes.

Recommendations

Based on results of this study the following recommendations were made:

1. It may be helpful to further study ED and its symptoms to identify other possible factors which contribute to the development of ED.
2. In the future, it may be helpful to study ED across diverse populations such as group exercise instructors and personal trainers.
3. In addition, it may be helpful to take into consideration other sports and study ED in a variety of sport contexts.
4. It may be helpful in the future to consider serious endurance athletes versus recreational exercisers to examine the differences in the prevalence of ED within those separate groups.
5. In the future, it may be useful to identify a variety of tools and strategies endurance athletes can utilize to evaluate their own exercise behavior and develop awareness for ED and its consequences.

6. To fully understand symptoms of ED, it may be helpful in the future to conduct qualitative studies to examine athletes' personal feelings and attitudes toward exercising.
7. In the future it may be helpful to study cultural or personal factors such as parenting styles, stress, and interpersonal relationships which contribute to the development of ED.

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APPENDIX A. RECRUITMENT STATEMENT

Dear Participant,

I am a master's student in Exercise and Sport Science at Ithaca College in Ithaca, NY. Currently I am conducting a study examining exercise behavior in endurance athletes. I am interested in your thoughts about, and your experiences with exercise.

The purpose of the study is to examine exercise behavior in participants of endurance events and your participation in this study may provide you with an awareness of the reasons why you choose to exercise. Participation in this study requires the completion of an online survey, which should take about 10 minutes to complete. Once you have completed the survey, we ask that you submit it online. Your answers will remain anonymous throughout this study to ensure your confidentiality. The only foreseeable risks of your participation in this study include the slight inconvenience of taking the time to complete the survey.

If you are interested in participating in this study, please click the following link:
<https://spreadsheets.google.com/viewform?hl=en&formkey=dEppdm0td3ZFRjNNRmhrUUhfZFImRGc6MQ#gid=0>

Submission of this survey verifies that you are at least 18 years of age and indicates your consent to participate. Please don't hesitate to contact me or my advisor with any questions about the study or for more information concerning this study. Your participation is greatly appreciated!

Sincerely, Maria "Masha" Proshutina
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APPENDIX B. DEMOGRAPHICS QUESTIONNAIRE

Directions: Please indicate how much you exercise on a weekly basis. Please think of exercise as being any structured physical activity which increases your heart rate (e.g. running, cycling, aerobics, weight training) and complete the following sentence:

1. I exercise for _____ hours per week.

Please provide accurate information to the following statements:

2. Age: _____

3. Gender (check one): ___ M ___ F

4. Ethnicity (check one):

_____ African-American _____ Asian-American _____ Caucasian/White
_____ Hispanic _____ Native-American _____ Other

5. Types of physical activity you engage in (check all that apply):

_____ Cycling _____ Running
_____ Swimming _____ Weight Training _____ Other (please list)

6. Number of endurance events per year (if applicable): _____

7. Race and distance completed: _____

APPENDIX C. BODY-SELF IMAGE QUESTIONNAIRE

Directions: The following questionnaire contains series of statements regarding your thoughts and feelings about you and your body (commonly called body image).

Please note that there are no “right” or “wrong” answers to this questionnaire. The most important concern is that your response should reflect what you really think or feel. Some of the questions may seem similar, but they are all slightly different. Please read each item carefully, so that you fully understand its meaning before you respond and respond as honest as possible.

Strongly Agree (1)	Agree (2)	Disagree (3)	Strongly Disagree (4)
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Instructions for questions 1-27: Statements 1 through 27 are all related to you and your body. Read each statement carefully, and decide how true the statement is for you. Use the rating scale below to indicate how true the statement is for you.

1. I think my body is unattractive. _____
2. How well my body is functioning influences the way I feel about my body. _____
3. Having a well-proportioned body is important to me. _____
4. My overall fitness level is high. _____
5. I compare my body to people I’m close to (friends, relatives, etc.). _____
6. I’ve often wanted to be taller. _____
7. I think my body looks fat in clothes. _____
8. My naked body makes me feel sad. _____
9. I pay careful attention to my face and hair, so that I will look good. _____
10. I look good in clothes. _____
11. I feel better about my body when I’m fitter. _____
12. Body size matters to me. _____
13. My body is healthy. _____
14. Being around good-looking people makes me feel bad about my body. _____
15. I wish I were a different height. _____
16. My body is overweight. _____
17. I feel depressed about my body. _____
18. I’m usually well-dressed. _____
19. My body looks good. _____

20. The way I feel about my body improves when I exercise regularly. _____

21. I care about how well-shaped my legs are. _____

22. My body is in shape. _____

23. I'm more aware of my body when I'm in social situations. _____

24. If I were a different height, I'd like my body better. _____

25. I wish I were thinner. _____

26. Most days I feel bad about my body. _____

27. I spend time making my appearance more attractive. _____

Instructions for questions 28-32: Statements 28 through 32 are all related to you and your relationship with others. Please read each statement carefully, and decide how much those statements are TRUE or FALSE for you. Use the scale below to indicate how true the statement is for you.

Definitely True (1)	Mostly True (2)	Don't Know (3)	Mostly False (4)	Definitely False (5)
------------------------	--------------------	-------------------	---------------------	-------------------------

28. I am always courteous, even to people who are disagreeable. _____

29. There have been occasions when I took advantage of someone. _____

30. I sometimes try to get even rather than forgive and forget. _____

31. I sometimes feel resentful when I don't get my own way. _____

32. No matter who I am talking to, I'm always a good listener. _____

APPENDIX D. EXERCISE DEPENDENCE SCALE

Directions: Using the scale below, please complete the following questions as honestly as possible. The questions refer to current exercise beliefs and behaviors that have occurred in the past 3 months. Please circle the answer that best fits you.

Never						Always
1	2	3	4	5	6	

1. I exercise to avoid feeling irritable. _____
2. I exercise despite recurring physical problems. _____
3. I continually increase my exercise intensity to achieve the desired effects/benefits. _____
4. I am unable to reduce how long I exercise. _____
5. I would rather exercise than spend time with my family/friends. _____
6. I spend a lot of time exercising. _____
7. I exercise longer than I intend. _____
8. I exercise to avoid feeling anxious. _____
9. I exercise when injured. _____
10. I continually increase my exercise frequency to achieve the desired effects/benefits. _____
11. I am unable to reduce how often I exercise. _____
12. I think about exercise when I should be concentrating on school/work. _____
13. I spend most of my free time exercising. _____
14. I exercise longer than I expect. _____
15. I exercise to avoid feeling tense. _____
16. I exercise despite persistent physical problems. _____

17. I continually increase my exercise duration to achieve the desired effects/benefits. _____
18. I am unable to reduce how intense I exercise. _____
19. I choose to exercise so that I can get out of spending time with my family/friends. _____
20. A great deal of my time is spent exercising. _____
21. I exercise longer than I plan. _____

APPENDIX E. MOTIVES FOR PHYSICAL ACTIVITY MEASURE

Directions: The following is a list of reasons why people engage in physical activities, sports and exercise. Keeping in mind your primary physical activity/sport, respond to each question (using the scale given), on the basis of how true is that response for you.

Not at all True for me				Very True for me		
1	2	3	4	5	6	7

“I exercise...”

1. Because I want to be physically fit. _____
2. Because it’s fun. _____
3. Because I like to engage in activities which physically challenge me. _____
4. Because I want to obtain new skills. _____
5. Because I want to lose or maintain weight so I look better. _____
6. Because I want to be with my friends. _____
7. Because I like to do this activity. _____
8. Because I want to improve existing skills. _____
9. Because I like the challenge. _____
10. Because I want to define my muscles so I look better. _____
11. Because it makes me happy. _____
12. Because I want to keep up my current skill level. _____
13. Because I want to have more energy. _____
14. Because I like activities which are physically challenging. _____
15. Because I like to be with others who are interested in this activity. _____

16. Because I want to improve my cardiovascular fitness. _____
17. Because I want to improve my appearance. _____
18. Because I think it's interesting. _____
19. Because I want to maintain my physical strength to live a healthy life. _____
20. Because I want to be attractive to others. _____
21. Because I want to meet new people. _____
22. Because I enjoy this activity. _____
23. Because I want to maintain my physical health and well-being. _____
24. Because I want to improve my body shape. _____
25. Because I want to get better at my activity. _____
26. Because I find this activity stimulating. _____
27. Because I will feel physically unattractive if I don't. _____
28. Because my friends want me to. _____
29. Because I like the excitement of participation. _____
30. Because I enjoy spending time with others doing this activity. _____

Thank you for taking the time and completing this survey.

Please submit when you're done.

Your participation is greatly appreciated!

APPENDIX F. PEARSON CORRELATIONS

	1	2	3	4	5	6	7	8	OAE
1	1.00								
2	.00	1.00							
3	-.04	.17*	1.00						
4	-.03	-.24**	-.03	1.00					
5	.19**	-.09	.00	-.02	1.00				
6	.25**	-.07	-.03	-.04	.14*	1.00			
7	.06	.06	-.11	-.01	.09	.11	1.00		
8	.04	.07	.11	.15*	.05	-.08	.01	1.00	
OAE	.06	.02	.13	.20**	.04	.11	.08	.17*	1.00
HFI	.10	-.13	-.15*	.11	.01	.16*	-.14*	-.04	.08
II	.15*	-.17*	-.31**	.04	.06	.11	-.12	.11	.06
HFE	.20**	-.06	-.02	.27**	.14*	.19**	.09	.17*	.49**
AG	.01	.01	-.12	.05	-.09	.21**	-.08	-.11	.20**
HD	-.05	-.04	-.05	.03	.06	-.02	-.04	-.07	-.05
FE	.08	.06	-.25**	-.28**	-.05	-.04	-.06	-.09	-.56**
NA	.04	-.03	-.28**	-.17*	-.07	-.04	-.10	-.16*	-.70**
SD	.07	-.20**	-.28**	-.04	-.01	.00	-.12	-.17*	-.41**
EDS	.29**	-.21**	-.08	.16*	.15*	.14*	-.13	-.08	-.05
WD	.05	-.22**	-.18**	.19**	-.03	-.06	-.16*	-.10	-.15*
CON	.05	.14*	.05	-.01	-.01	.02	-.03	-.06	-.17*
TOL	.14*	-.20**	.10	.13	.21**	.17*	-.12	-.07	.13
LC	.26**	-.16*	-.03	.07	.03	.19**	-.05	-.05	-.01
RED	.24**	-.12	.02	.13	.17*	.06	-.11	.01	-.13
TIME	.43**	-.12	-.03	.19**	.22**	.23**	-.04	.04	.14
INT	.23**	-.15*	-.12	.11	.11	.10	-.09	.00	-.03
BSIQ	.11	-.13	-.32**	-.01	-.02	.10	-.14	-.08	-.12
MPAM	.20**	-.15*	-.24**	.02	.03	.18*	-.21**	.09	.06
ENJ	.12	-.08	-.19**	.03	.11	.05	-.20**	.14*	.11
COMP	.21**	-.11	-.10	.09	.14*	.17*	-.09	.08	.18*
APP	.21**	-.20**	-.20**	.03	-.02	.21**	-.20**	-.04	-.02
FIT	.19**	-.06	-.09	-.01	.12	.22**	-.08	-.05	.21**
SOC	-.01	-.06	-.22**	.00	-.06	-.03	-.06	.22**	-.08

Appendix F continued

	HFI	II	HFE	AG	HD	FE	NA	SD	EDS
1									
2									
3									
4									
5									
6									
7									
8									
OAE									
HFI	1.00								
II	.56**	1.00							
HFE	.21**	.21**	1.00						
AG	.27**	.36**	.18*	1.00					
HD	.21**	.24**	-.05	.15*	1.00				
FE	.07	.24**	-.50**	.01	.28**	1.00			
NA	-.02	.11	-.55**	-.05	.13	.69**	1.00		
SD	.29**	.38**	-.24**	.27**	.24**	.47**	.50**	1.00	
EDS	.28**	.25**	.07	.22**	.06	.15*	.15*	.21**	1.00
WD	.33**	.24**	.00	.11	.12	.16*	.22**	.25**	.60**
CON	.11	.06	-.20**	-.02	.01	.19**	.21**	.08	.57**
TOL	.12	.09	.16*	.13	-.06	-.13	-.11	-.01	.58**
LC	.18**	.16*	.06	.20**	.00	.07	.08	.12	.79**
RED	.22**	.21**	-.03	.09	.11	.17*	.21**	.22**	.73**
TIME	.18**	.21**	.27**	.23**	.01	.03	-.02	.04	.76**
INT	.12	.15*	-.02	.18**	.10	.19**	.13	.18**	.72**
BSIQ	.55**	.70**	.00	.52**	.61**	.57**	.41**	.70**	.30**
MPAM	.31**	.41**	.13	.29**	.10	.16*	.06	.28**	.38**
ENJ	.23**	.25**	.19**	.15*	.04	.05	-.01	.08	.26**
COMP	.17*	.22**	.20**	.14	.01	-.06	-.14	.10	.25**
APP	.43**	.55**	.04	.42**	.20**	.31**	.22**	.47**	.42**
FIT	.31**	.31**	.26**	.15*	.02	-.02	-.13	.10	.21**
SOC	-.03	.07	.00	.07	.02	.09	.05	.13	.05

Appendix F continued

	WD	CON	TOL	LC	RED	TIME	INT	BSIQ	MPAM
1									
2									
3									
4									
5									
6									
7									
8									
OAE									
HFI									
II									
HFE									
AG									
HD									
FE									
NA									
SD									
EDS									
WD	1.00								
CON	.29**	1.00							
TOL	.14*	.23**	1.00						
LC	.30**	.35**	.41**	1.00					
RED	.43**	.33**	.24**	.51**	1.00				
TIME	.31**	.24**	.45**	.54**	.58**	1.00			
INT	.27**	.25**	.28**	.61**	.54**	.50**	1.00		
BSIQ	.30**	.10	.04	.19**	.27**	.21**	.26**	1.00	
MPAM	.19**	.15*	.32**	.26**	.19*	.43**	.19*	.41**	1.00
ENJ	.23**	.09	.20**	.14	.16*	.33**	.07	.22**	.77**
COMP	0.03	.11	.41**	.18**	.09	.35**	.06	.16*	.78**
APP	.24**	.15*	.23**	.37**	.31**	.39**	.27**	.62**	.74**
FIT	.08	.04	.27**	.14*	.12	.39**	.03	.22**	.67**
SOC	.02	.12	.03	-.01	.01	.12	.07	.09	.64**

Appendix F continued

	ENJ	COMP	APP	FIT	SOC
1					
2					
3					
4					
5					
6					
7					
8					
OAE					
HFI					
II					
HFE					
AG					
HD					
FE					
NA					
SD					
EDS					
WD					
CON					
TOL					
LC					
RED					
TIME					
INT					
BSIQ					
MPAM					
ENJ	1.00				
COMP	.60**	1.00			
APP	.41**	.37**	1.00		
FIT	.56**	.61**	.43**	1.00	
SOC	.35**	.39**	.22**	.16*	1.00

** = $p < .01$, * = $p < .05$

1 = HoursEX; 2 = AGE; 3 = SEX; 4 = RUN; 5 = BIKE; 6 = LIFT; 7 = OTHER; 8 = EVENTS; OAE = Overall Appearance Evaluation; HFI = Health-Fitness Influence; II = Investment in Ideals; AG = Attention to Grooming; HD = Height Dissatisfaction; FE = Fatness Evaluation; NA = Negative Affect; SD = Social Dependence; EDS = Exercise Dependence Scale; WD = Withdrawal; CON = Continuance; TOL = Tolerance; LC = Lack of Control; RED = Reduction in Other Activities; TIME = Time; INT = Intention Effects; BSIQ = Body-Self Image Questionnaire; MPAM = Motives for Physical Activity Measure; ENJ = Enjoyment; COMP = Competence; APP = Appearance; FIT = Fitness; SOC = Social.

APPENDIX G. MEANS AND STANDARD DEVIATIONS FOR GENDER BASED
ON AGE

Means (M) and Standard Deviations (SD) for Gender Based on the Age Group

Gender	Age Group							
	19-34		35-50		51-66		67-83	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Male	67.00	15.23	62.44	15.59	60.54	11.66	50.00	5.66
Female	68.83	14.82	64.91	17.30	61.17	12.24	. ^α	. ^α

Note. ^α. Corresponding Means and Standard Deviations are not estimable because there were no females in 67-83 age group.

