EXERCISE DEPENDENCE AND ITS RELATION TO EATING ATTITUDES AND BEHAVIOURS IN MALE AND FEMALE GYM MEMBERS: A QUANTITATIVE AND QUALITATIVE ANALYSIS

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ABSTRACT

Generally, exercise is an adaptive behaviour that serves to enhance physical and psychological well-being. However, recently the potential abuses of engaging in excessive exercise have received much attention. Some individuals may become so caught up in their exercise routine that they may be quite unwilling or unable to stop exercising, even when it is medically or socially contraindicated. An increasing number of physically active individuals seem to be vulnerable to the 'exercise dependence' syndrome.

To examine the link between exercise dependence and eating pathology, 57 women and 32 men were recruited at three Health and Racquet Clubs in the Cape Town area. They varied in the type and amount of exercise involved in and expressed different degrees of the pressure to be fit versus the pressure to be thin.

A battery of six questionnaires were administered: they included the Self-Report Exercise Scale; the Eating Attitudes Test (Garner & Garfinkel, 1979); the Eating Disorder Inventory (Garner, Olmsted & Polivy,1983); a Dietary History Questionnaire; the Exercise Dependence Questionnaire (Ogden, Veale & Summers, 1993); and the Maudsley Obsessive Compulsive Questionnaire (Hodgson & Rachman, 1977).

It was hypothesized that female subjects would show marked preoccupation with weight and eating when compared with male subjects. Furthermore, male subjects were expected to be more inclined to be susceptible to exercise dependence.

The results revealed that female subjects were more prone to weight and diet preoccupation than males. There was a high incidence of eating pathology in women, and many pointed out that their eating disorder was not diagnosed. Women also tended to be less satisfied with their bodies and presented with a higher drive for thinness when compared with men who put a higher emphasis on

cultural values of fitness.

Although more women presented with a history of weight-cycling, individuals with an unstable weight history were not more likely to have symptomatic eating attitudes or a more negative body image than those with no such history.

Other findings were that no gender differences were noted on exercise dependence and thus the hypothesis by Yates (1983), which implies that excessive exercise in males is analogous to anorexia nervosa in females, was not supported in this study. However, women were more likely than men to use exercise as a weight-control mechanism.

Results showed that exercise dependence was not related to perceptions of poor control over exercise behaviour or elevated obsessive-compulsive tendencies. On average, exercise dependent individuals tend to exercise excessively (8,3 hours per week).

An interesting finding of this study was that exercise dependence appeared to be associated with a high drive for thinness and body dissatisfaction. This indicates that certain shared characteristics with anorexia nervosa were evident in exercise dependent individuals. Additionally it points to the fact that exercise dependence may be associated with certain negative psychological characteristics.

Considerable support for the association between high levels of exercise dependence and eating pathology was provided by the analysis. This supports the concept of 'secondary exercise dependence', where exercise dependence is considered not to be an independent problem, but rather secondary to an eating disorder.

A follow-up study was conducted on fourteen individuals, five of whom were interviewed. Results indicated that exercise dependence did not follow a specific pattern over time, but appeared to have decreased slightly on average. Eating disorder indices remained stable over time. A tentative conclusion was that on

average, exercise involvement does not cause eating disorder tendencies to worsen, but rather keeps them constant.

However, contradictory evidence was unfolded in one specific case history (an ex-marathon runner), which revealed that an obsessive involvement in exercise could lead to eating pathology and a subsequent reduction in exercise involvement could in fact improve eating disordered tendencies.

The other interviewees were in agreement that eating disturbance and weight concerns led them to becoming more exercise dependent, rather than exercise dependence causing an increase in eating disturbance.

The interview analysis supports the finding that exercise is associated with many positive aspects such as enhancing self-esteem, stress management, mood improvement and increasing vigour. Although some negative aspects of exercise dependence were noted by interviewees (e.g. withdrawal symptoms when unable to exercise or exercising when it is socially contraindicated), they generally expressed how valuable exercise is to them in their lives. This emphasizes that exercise dependence need not necessarily be viewed as an 'illness'.

It is concluded that exercise dependence and eating pathology may change their course over time and are a function of certain biopsychosocial factors. The above results can best be described in terms of the risk-factor model (Yates, Shisslak, Crago & Allender, 1994), which postulates that individuals are at risk for overcommitment as a result of life circumstances.

Research into the relationship between exercise dependence and eating pathology in non-clinical populations is recommended. Furthermore, it is stressed that unhealthy diet and exercise behaviours need to be recognized by health professionals who can intervene.

CHAPTER ONE

SUMMARY OF CONTENTS

This study measures the incidence of exercise dependence and eating disorders across genders. Of interest, is whether a link between exercise and eating pathology can be established in a general population of physically active individuals. Interviews are utilized to further explore this link.

Chapter 2 reviews the literature, emphasizing the meaning of the concept 'exercise dependence' and its possible link to eating pathology. Various models that explain the link are outlined.

In Chapter 3, the hypotheses to be tested in this study are outlined. This chapter also includes the assumptions, limitations and motivation for the study.

Chapter 4 outlines the methods employed in the study. It includes information on the subjects, the instruments and the statistics to be used.

Chapter 5 discusses the results of the questionnaire analysis, demographic details and gender comparisons.

The follow-up study and subsequent interview analysis are contained in Chapter 6. Information gathered during the interviews is elaborated on by outlining cases.

Chapter 7 discusses the results in terms of gender comparisons and relevant hypotheses which were tested.

Chapter 8 outlines the limitations of the study and suggestions for further research are made in Chapter 9.

CHAPTER 2

INTRODUCTION

Exercise Addiction

Although appropriate exercise has many health benefits, exercise can become a compulsive, driven activity that may be potentially harmful to an individual. As early as 1970, it was noted that exercise could have addictive qualities for some (Baekeland, 1970). Glasser (1976) suggested that a continual striving for a heightened sense of well-being may lead to a 'positive addiction' to exercise and a state of euphoria in regular exercisers. Kostrubala (1976) contributed to the popularity of recreational jogging and running, by expressing a similar view on the benefits of regular running in his popular book, 'The Joy of Running'.

A more recent survey on the psychological aspects of running showed that up to two-thirds of regular runners experience the familiar 'runners high' (Cullen, 1983), which is often explained by the increased endorphin levels in the blood of physically active individuals (Moore, 1982).

According to Sacks and Sacks (1981), 'exercise addiction' is a widely accepted concept in the fields of sports science and physical education. Sacks (1981) suggested that persistent exercise can be viewed as a 'positive addiction' as it benefits the individual. Sacks (1982) defined exercise addiction as 'addiction of a psychological and/or physiological nature, upon a regular regimen of exercise' (Sacks, 1982, p.12).

Much of the literature concerning the issue of excessive exercise has been published in commercial running magazines and journals of sports medicine. It has been widely termed, 'exercise abuse' (Otis & Goldingay, 1991); 'the futile attraction ' (Cimons, 1988); 'excessive exercise' (Wichmann & Martin, 1992); 'exercise dependence' (De Coverley Veale, 1987); 'habitual running' (Blumenthal, Rose & Chang, 1985); 'fitness fanaticism' (Little, 1979); 'running anorexics'

(Norval, 1980); or 'activity anorexia' (Epling and Pierce, 1988).

Le Grange and Eisler (1993) voiced their concern that different authors may be talking about very different phenomena.

De Coverley Veale (1987) argued that a general term like 'exercise dependence' is more desirable. In this study it was decided to use this term.

Nowadays, more and more people are becoming intensely involved in regular exercise regimes (Lamb, 1984). According to a US survey, eight out of ten Americans exercise regularly and more than three out of ten exercise strenuously three or more times per week (Harris et al., 1983).

It is noted that attempts to improve general fitness levels can often lead to an addictive involvement in exercise.

Exercise Deprivation : Withdrawal Symptoms

An obvious step towards understanding more about exercise addiction is to study the effects of exercise deprivation and the consequent unpleasant withdrawal symptoms.

Baekeland (1970) managed to convince only 14 students to participate for money in a study on exercise deprivation. Among exercisers there was a general unwillingness to deprive themselves of exercise for a monthly period. By studying sleep recordings and subjective reports of the experimental subjects, Baekeland found that exercise deprivation was extremely stressful for them, as their anxiety and arousal levels increased considerably.

Further work relating to withdrawal symptoms in regular exercisers was done by Thaxton (1982), who randomly assigned 24 males and 9 females (habitual runners who ran at least five times per week) to different groups according to the Solomon four-group design. On the day of the experiment, two groups ran while the other two groups did not. Results showed the deleterious effects of exercise deprivation on mood (anxiety, depression, fatigue and vigour) of the Profile of Mood States. It

is suggested that variation from the usual running schedules may have negative effects for habitual runners.

In their analysis of this topic, Morris, Steinberg, Sykes and Salmon (1990) studied 40 male runners for six weeks. One group continued running while the other group stopped running for the middle two weeks of the study. Questionnaires were completed after each week and elevated scores on the General Health Questionnaire, somatic symptoms, anxiety, insomnia and social dysfunction scales were common in times of exercise deprivation. However, findings revealed that emotional disturbances (depression and anxiety) only appeared after a longer period of exercise abstinence. The alternate prohibition and allowance of exercise produced and in turn alleviated withdrawal symptoms. The authors suggest that the avoidance of withdrawal symptoms may be the primary motivation to continue to exercise, and thus exercise may be regarded as addictive.

A recent study by Conboy (1994) examined the effects of exercise withdrawal on mood states in runners. By utilizing the Profile of Mood States, it was revealed that all subjects experienced heightened dysphoria on 'no run' days. Generally, findings indicated that neither commitment nor dependence were associated with changes in mood states. Interestingly, the group with high commitment and high dependence on running, showed the least withdrawal symptoms, when compared with a low commitment, dependence group. This contradicts findings which suggest that exercise dependent individuals are more prone to experience withdrawal symptoms upon cessation of exercise.

The Negative Effects of Excessive Exercise (EXE)

Besides withdrawal symptoms, many additional negative consequences of excessive exercise were reported by various authors.

Morgan (1979), while acknowledging the benefits of running, also noted its potential for abuse. He drew attention to the withdrawal symptoms resulting from the cessation of exercise, and the continuation of exercise, even when it is socially or medically contraindicated. He also pointed out that an increasing number of

overuse injuries are being reported at sports clinics.

When the benefits and the risks of running were surveyed in an epidemiologic study (Kaplan, Powell, Sikes, Shirley & Campbell, 1982) , the benefits ranged from smoking cessation to weight loss, and the risks included injuries, dog bites, collisions with cars and being thrown with objects. Despite these risks, the runners continued to exercise.

Questionnaire assessments of marathon runners indicated that more than 35% of these highly active individuals experience negative effects of their exercise, but persisted nonetheless (Summers, Machin & Sargent, 1983; Summers, Sargent, Levey & Murray, 1982). The reported negative effects included injuries, marital strain, psychological problems (e.g. irritability, obsession with running), interference with work and lack of time for other activities. As many as 82 percent of the subjects acknowledged some form of exercise addiction.

A valuable contribution by De Coverley Veale (1987) was the proposal of diagnostic criteria for 'exercise dependence'. His observation that exercise addicted individuals remain active even when they are injured or ill, was also recognized by Hofstetter et al. (1991).

Stachenfeld, Gleim and Nicholas (1992) also pointed out the risk of injury and staleness when training excessively. Similarly, Wichmann and Martin (1992) discussed that the signs of exercise addiction are frequently a history of multiple overuse injuries. They stressed that physicians need to treat these injuries and help patients to overcome the underlying problems of their addiction to exercise.

In a severe case study report, de Fries (1981) identified two cases in whom excessive exercising had become full-blown psychotic episodes. This indicates that not only physical, but also psychological problems result from exercise dependence.

Measuring Exercise Addiction

In a study conducted on runners, Carmack and Martens (1979) assessed aspects of exercise addiction by using a commitment to running scale (CR). Both, euphoria while running and withdrawal symptoms when a run was missed, correlated with commitment to running. Furthermore, regression analysis indicated that perceived addiction, state of mind and length of run are significant predictors of CR.

In attempting to quantify the negative addiction to exercise, Hailey and Bailey (1982) found that the scores on a negative addiction scale increased with the length of time of exercise involvement. In a more recent book, Polivy (1994) also speculated that addiction to exercise presumably takes some time to become problematic.

The Blumenthal Obligatory Running Questionnaire was designed to measure compulsive exercise (Blumenthal, O'Toole & Chang, 1984), and was generated on the basis of descriptions of obligatory runners in the Yates et al. (1983) study. However this scale focuses mainly on running and not other sports.

Another attempt at measuring the negative addiction to exercise was made by Rudy and Estok (1989), who developed a Likert scale for this purpose. A large sample of marathon runners completed the questionnaires and addiction correlated negatively with self-esteem and positively with anxiety and injury rates.

Subsequently, Chapman and De Castro (1990) constructed and evaluated the Running Addiction Scale (RAS) by administering it to 32 male and 15 female runners. Running addiction was found to be associated with a high frequency of running and with positive personality characteristics.

In a more recent paper by Ogden, Veale and Summers (1993), the exercise dependence questionnaire was developed and validated. This is a useful tool to measure exercise dependence in future research as it consists of eight factors (i.e. (a) interference with family life; (b) positive reward; (c) withdrawal symptoms; (d)

weight control; (e) insight; (f) social reasons; (g) health reasons; and (h) stereotyped behaviour). It was decided to use this questionnaire in the present analysis because it is an instrument that can be applied to any form of sport.

The Psychological Dynamics of Excessive Exercise

Of interest to researchers were the psychological characteristics associated with exercise dependence.

To examine the concept of exercise addiction in more detail, Sachs and Pargman (1979), employed an in-depth interview examination on twelve adult male runners. They tried to identify personality characteristics that would predict who is susceptible to becoming addicted to fitness, but no definite correlations were established. The interview analysis in this paper will be utilizing an adapted version of the structured interview by Sachs and Pargman (1979).

A commitment to exercise has been argued to appear at times of heightened developmental uncertainties and identity crisis (Yates, Leehey & Shisslak, 1983). The assumption is that the identity as an 'obligatory exerciser' provides the individual with a sense of self. Maintaining self-discipline and control to keep up the exercise commitment provides a personal sense of integrity and self-worth.

Further, there is some support for the contention that excessive exercisers are characterized by obsessive compulsive tendencies. In a study by Kagan (1987), joggers appeared to score higher than controls on a compulsiveness scale. This was not supported by Goldfarb and Plante (1984), who studied the personality characteristics of more than 200 athletes. Results revealed that very few athletes showed excessively obsessive, perfectionistic or anxious behaviour. Only the most obligatory athletes showed high obsessive and perfectionistic trends.

Compulsive tendencies will be assessed in this study by using the Maudsley Obsessive Compulsive Questionnaire (Hodgson & Rachman, 1977).

In a study by Nudelman, Rosen and Leitenberg (1988), male 'obligatory runners' were found to have perfectionistic tendencies, similar to those of eating disordered patients. Yates, Shisslak, Crago & Allender (1994) also suggested that compulsive athletes are persistent, perfectionist, high-achieving individuals who have some similarities with eating disordered individuals. Morgan and Costill (1972) supported this argument, as their results indicated that marathon runners in comparison to other athletes, are usually introverted and antisocial.

In some cases, excessive exercisers have been described as being uncomfortable with the expression of feelings such as anger - they tend to inhibit their feelings and use running to express their anger (Wheeler, Wall, Belcastro, Conger & Cumming, 1986; Yates, Leehey & Shisslak, 1983).

The literature reveals that the most obvious psychological characteristic of excessive exercisers is that they are intensely committed to their exercise routine. Many of them have been reported to feel guilty and depressed when unable to exercise due to injuries (Morris et al., 1990). Many tend to exercise even when they are injured or ill, or when it is socially contraindicated. At times, continued exercising despite medical advice to the contrary, has even resulted in death (De Coverley Veale, 1987; Noakes, Opie, Beck, McKechnie, Thompson, Stern, Williams, Duncan, Haskell & Wood, 1977).

Furthermore, the link between excessive exercise and depression has been studied. Although Colt et al. (1981) reported a high prevalence of affective illness in women runners, this was less clear in male runners and frequently running instead helped to alleviate depression in some runners.

When Anshel (1991) compared addicted and non-addicted exercisers, the addicted exercisers experienced a high degree of positive affect after engaging in exercise. This was not true for the non-addicted counterparts.

In another study by Gadpaille, Sanborn and Wagner (1987), female runners who were not menstruating had an increased history of affective disorder and a high incidence of family history of affective disorder, when compared with menstruating

runners. However, it was not clear whether amenorrheic females had anorexia nervosa and thus it tells us little about the link between excessive exercise, anorexia and depression.

Usually, the relationship between exercise and mood indicates that exercise enhances mood (Blumenthal et al., 1985; Simons, McGowan, Epstein, Kupfer & Robertson, 1985), and is a healthy way to manage a distressed mood (Folkins & Sime, 1981; Greist, Klein, Eischens, Faris, Gurman & Morgan, 1979).

In various questionnaire studies, exercisers were compared with non-exercisers and some results showed no differences on demographic and personality variables, while others showed a healthier adjustment in athletes (Dowd & Innes, 1981; Kukla & Pargman, 1976; Morgan, 1985; Morgan & Costill, 1972; Renfrow & Bolton, 1981).

It is concluded that the above studies usually chose small convenience samples and were mostly cross sectional, thus lacking insight about the personality aspects of exercisers in the general population.

Of particular interest in the present paper are findings which suggest that a large proportion of excessive exercisers tend to present with eating disorder symptomatology. This topic is dealt with in a later section.

The role of Excessive Exercise (EXE) in Eating Disorders

Excessive exercise (EXE) has long been found to be a common feature of eating disorder patients (Gull, 1873; Laseque, 1873). More recently, many authors have observed excessive physical activity in their patients with anorexia nervosa (Anderson & Mickalide, 1983; Beumont, Arthur, Russell & Touyz, 1994; Blinder Freeman & Stunkard, 1970; Bruch, 1973; Crisp, Hsu, Hareling & Hartshorn, 1990; Feighner, Robins, Guze, Woodruff, Winokur & Munoz, 1972; Halmi, 1974; King, 1963; Margo, 1987; Slade, 1973; Thomas, 1967; Touyz, Beumont & Hoek, 1987; Yates, 1991).

In addition, some case studies have provoked discussions on anorexia nervosa

presenting as morbid exercising (Chalmers, Catalan, Day & Fairburn, 1985; Katz, 1986; Norval, 1980; Roberts & Elliot, 1990; Smith, 1980; Waldstreicher, 1985).

The activity levels of anorexics have been assessed quantitatively by Stunkard (1960) and Blinder et al. (1970), who used pedometers and found that high levels of activity prevailed in most anorexic patients.

Not only do anorexic patients exercise to excess, but they are generally hyperactive in their everyday lives. Janet (1929) and Crisp (1965) observed restless, hurried, stereotyped behaviour patterns in anorexic patients. Dally (1969) distinguished between two types of overactivity - on the one hand, anorexic patients are overactive in order to lose weight. On the other hand, they may increase their activity levels to prove to others that they are fit and well.

Kron, Katz, Gorzynski and Weiner (1978), discovered that eating disordered women choose goal-directed, structured exercise routines. Beumont and co-workers (1994) also emphasized that eating disordered patients may slowly move from their engagement in enjoyable social sports to dreaded, solitary and repetitive exercise. Furthermore, their exercise may become compulsive, which is often reflected in their adoption of a daily structured exercise routine.

In some anorexic patients, the 'pursuit of fitness' overrides the 'pursuit of thinness'. Epling and Pierce (1988) suggested that the association of increasing activity and reducing caloric intake is essential for the pathogenesis of illness in a subset of anorexic patients, who they called 'activity anorexics'. Touyz et al. (1987) have described 15 patients with anorexia nervosa in whom excessive exercise was the major behavioural problem, as the 'pursuit of fitness' was the core symptom of their psychopathology. They referred to these patients as 'exercising anorexics'. In 60 percent of these patients, exercising had led to subsequent dieting and they engaged in 'debting' behaviours (the relationship between food intake and exercise was clearly established), i.e. when unable to exercise they would radically reduce their caloric intake.

In patients with anorexia nervosa the possible health risks of engaging in excessive exercise need to be emphasized. As they commonly suffer from osteoporosis, they are prone to overuse injuries and other orthopaedic discomforts when exercising (Russell & Beumont, 1987). Anorexic patients may worsen their state of undernutrition by overexercising (Beumont et al., 1994) and abnormal cardiovascular responses (Schocken, Holloway & Powers, 1989) and electrolyte disturbances (Hall, Hoffman, Beresford, Wooley et al., 1989) are among the negative effects of excessive exercising in eating disordered individuals.

In their view of the treatment of anorexia nervosa, Beumont, Arthur, Russell & Touyz (1994) suggested the inclusion of a supervised exercise program by which overactivity may be addressed in such patients. Such a program would permit the patients to strengthen and stretch their bodies while engaging in moderate exercise.This appears to be a useful treatment option as they do not need to give up on exercising altogether.

The Relationship between Food Intake and Exercise

Dieting and exercise are linked in order to produce weight loss and clearly a self-reinforcing behaviour pattern of excessive dieting and exercise can establish itself in certain individuals.

According to Crisp (1985), the hyperactivity of anorexia nervosa is merely a side effect of the heightened arousal experienced as a result of the weight loss. This explanation suggests that starvation leads to hyperactivity. Beumont et al., (1984) examined the sequence of symptoms in their anorexic patients. They found that dieting came first, followed by exercise, thus supporting the above argument.

On the other hand, Epling and Pierce (1988) reviewed animal and human studies which indicated that strenuous activity suppresses appetite and this leads to a reduced food intake and weight loss. This biobehavioural perspective explains how a self-perpetuating loop is established - the resultant weight loss leads to a heightened motivation to exercise and a further increase in activity in turn reduces

appetite, leading to further weight loss. The result is a vicious circle of undernutrition and overactivity.

Rowley (1987) speculated that exercising may precipitate anorexia and bulimia nervosa in the same way that eating disorders may be triggered by a restrictive diet. Katz (1986) had described two cases where long-distance running clearly played a role in the development of anorexia nervosa, thus also supporting the above hypothesis that compulsive exercise may lead to eating disorders.

Another argument presented by Waldstreicher (1985) is that anorexia nervosa and compulsive exercise are related variants of a similar pathology. Smith (1980) added to this argument by presenting a case study of a rower whose excessive exercising and weight loss resembled anorexia nervosa. The author contended that the emphasis is on thinness and maintaining a very low fat percentage puts athletes at risk of engaging in behaviours that resemble eating disordered patients. They are often averse to food, have eating binges at the end of a tournament, set unrealistic goals for weight loss and in addition, female athletes commonly have menstrual problems and amenorrhea.

Chalmers, Catalan, Day and Fairburn (1985) reported a case study of a woman who exercised compulsively despite serious injuries and amenorrhea. Excessive exercise was the dominant symptom of her diagnosed eating disorder. Another case history was presented by Patel, Andrews and Bowman (1983), who referred to an obligatory runner who was very thin, impotent and whose blood profile resembled that of an anorexic. Liberman and Palek (1984) also found abnormalities in an obligatory athlete that were identical to those seen in anorexic patients. As a result, a differential diagnosis between obligatory exercise and anorexia nervosa is not always clear.

In a review by Thompson and Blanton (1987), it was demonstrated that food restriction and exercise affect the body's energy balance mechanisms. They proposed a model of exercise dependence based on sympathetic arousal. Reductions in sympathetic output to exercise may lead to exercise dependence, as

training levels need to be increased in order to produce pre-training arousal levels. However, this theory still needs to be tested empirically.

Of importance is the fact that the weight regulation practices of athletes may influence health, metabolism and performance. Brownell, Nelson Steen and Wilmore (1987) presented a theory which relates the frequent weight fluctuations (e.g. in wrestlers, as reported by Nelson Steen & Brownell (1990)) and low weight and low percentage body fat (e.g. in runners, gymnasts, figure skaters) to changes in body composition and metabolism. It is explained that physiological changes may result in enhanced food efficiency (weight as a function of caloric intake) as the body protects and replenishes its energy stores. To put it simply, athletes may live on a surprisingly low calorie diet considering the amount of calories burned during training.

Symptomatology of Eating Disorders in Exercisers

Loosli and Benson (1990) described how nutrition affects athletes in three primary ways: (a) performance; (b) injuries and (c) eating disorders. For the present purposes, the main focus is on (c) eating disorders.

Various authors draw attention to the problem of eating disorders that are increasingly common in female athletes (Kotze & Labadarios, 1990; Sundgot Borgen & Corbin, 1987; Temple, 1993; Wichmann & Martin, 1993). The fact is that thinness is falsely encouraged by coaches, parents and peers and this further enhances the often dangerous dietary practices of athletes (Myburgh & Noakes, 1990). Thornton (1990), stressed that in sports competitors, weight loss can often get out of hand and potential eating disorders need to be identified and treated in time. Furthermore, Smith (1976) advised that rapid weight loss as a result of starvation and dehydration compromises strength and endurance.

Specific sports have consistently been found to present with high incidences of eating pathology in participants.

An elevated incidence of anorexia nervosa is very common in ballet dancers

(Garfinkel, 1981; Garner & Garfinkel, 1980). These researchers reported higher mean scores on an eating disorder pathology questionnaire in dancers and up to 30% of them scored in the anorexic range. Similarly, Brooks-Gunn, Warren and Hamilton (1987) found that 33% of the dancers in their study had amenorrhea which was related to eating problems.

This indicates that eating disorder symptomatology in athletes is linked to endocrine disturbances. Menstrual dysfunction and amenorrhea is a common occurrence in female athletes who limit their nutritional intake (Mansfield & Emans, 1989).

In a study by Walberg and Johnston (1991), it was found that female body builders were more likely to have menstrual disorders than student controls, and many of the weight lifters had been former anorexics. As many as 67 percent of the competitors acknowledged being terrified of fat and 58 percent reported being obsessed with food. In addition, laxative use was higher in weight lifters than controls.

Nattiv and Lynch (1994) referred to the female athlete triad - the connection between disordered eating, amenorrhea and osteoporosis which poses an acute risk to long term health in female athletes. On the other hand, an endocrine disturbance in male excessive exercisers, can manifest itself in reduced testosterone levels (Dohn & Louis, 1978; Wheeler, Wall, Belcastro, Conger & Cumming, 1986).

In a survey of dancers in America and Europe, Hamilton, Brooks-Gunn and Warren (1985) suggested that anorexic dancers differ from dancers with no eating disorders. They argued that socio-cultural factors are related to the reported incidence of eating disorders. Furthermore, the level of competition and ethnicity was related to the reported cases of anorexia nervosa. Hamilton and coworkers (1986) conducted a nutritional survey on 19 professional dancers and discovered that weight concerns are manifested in the nutritional habit of professional dancers - those nearer their ideal weight dieted more than thinner dancers.

Athletes in other sports (besides dancers) also present with high eating pathology. Borgen and Corbin (1987) found that athletes in sports emphasizing thinness

showed a higher incidence of weight preoccupation than athletes in sports that did not focus on body size.

A comparative study of female figure skaters, ballet dancers and swimmers was conducted to examine the effects of exercise on dieting, weight concerns, menarcheal age and self-image (Brooks-Gunn et al., 1988). In sports emphasizing thin body shape (i.e. dancing and skating), higher scores for dieting, bulimia, perfectionism, menarcheal age and oral-control were evident. Dancers had higher dieting scores than skaters, while swimmers did not differ on these variables from nonathletic control subjects.

According to Drummer, Rosen, Heusner, Roberts and Counsilman (1987), compulsive dieting is prevalent among athletes even when thin body shape is not a focus of the sport. They had studied young, competitive swimmers who also used pathogenic weight-loss techniques.

Often, weight preoccupation is performance driven. The weight control techniques of female athletes from two US universities were assessed (Rosen, McKeag, Hough & Curley, 1986). At least one pathogenic weight control technique (e.g. vomiting, laxative abuse, diuretics, diet pills) was acknowledged by 32 percent of the subjects. In a follow-up survey, most of the athletes admitted that their weight preoccupation was related to their sport performance, rather than their appearance.

Some studies considered looking at the general exercising population, i.e. not necessarily sport which is performance driven.

In a series of studies, Davis examined exercise and eating issues mainly in female athletes. Davis (1990) examined whether avid female exercisers emphasize their appearance more and are more narcissistic about their bodies, than non-exercisers. Exercisers reported that their physical appearance was important to their self-esteem. Poorer emotional well- being was correlated with greater weight and diet concerns and body dissatisfaction only in exercisers. It was concluded that regular exercise may be related to body narcissism and may

increase the likelihood of developing obsessive attitudes toward weight control in susceptible individuals.

As physical fitness has become a 'social obsession', Davis (1990) looked at the role of addictive exercise in the development of eating disorders in a non-clinical population, by correlating an addiction scale with all Eating Disorder Inventory subscales. She found that addictiveness did correlate with all weight and diet variables as well as perfectionism in exercising women.

The issue of the functional role of exercise in the development of weight and eating concerns was taken up by Davis, Fox, Cowles, Hastings and Schwass (1990). They drew the important conclusion that regular exercise may be causally related to excessive weight and diet concerns in women, by testing a structural equation model, which supported the notion that physical activity has a significant direct effect on weight and diet concerns.

In another study, Davis (1992) investigated the role of personality factors and body image in the study of weight preoccupation among female athletes. Athletes were more weight preoccupied, dieted more frequently and more often wished to lose weight in comparison to non-athletes.

In a study on gender differences, Davis and Cowles (1991) compared physically active men and women on variables such as body image, weight and diet concerns and exercise participation. Generally, women were more dissatisfied with their bodies, emphasized their appearance more and were more likely than men to exercise to lose weight. Social aspects such as health promotion and sex roles are likely to affect attitudes to physical appearance and attractiveness among both sexes.

Another study on gender differences by Kiernan, Rodin, Brownell et al. (1992), examined the association between level of exercise and the degree of weight preoccupation in a large sample of male and female runners. Exercise level (defined as weekly running mileage) was positively associated with excessive weight and eating concern in males, but not females. Weight-cycling

history correlated with symptomatic Eating Attitudes Test scores. The authors stress the importance of exercise levels in the development of serious weight preoccupation.

The latest study by Davis and Fox (1993) focused on excessive exercise and weight preoccupation in 351 women. Excessive exercisers were found to be more satisfied with their bodies, less neurotic and more extroverted than non-exercisers. No psychological similarities between excessive exercisers and women with eating disturbances were found, except that both groups had a high level of body focus.

In another study by Pasman and Thompson (1988), disturbed body images as well as eating disturbances were investigated in obligatory runners, obligatory weight lifters and controls. Runners and controls overestimated their body size more than did weight lifters. Further, runners and weight lifters had more drive for thinness than did controls. Generally, females were not worse than males at size estimation, but females were more dissatisfied with their bodies than males. Runners and weight lifters had greater eating disturbance than controls, and females had more eating psychopathology than males.

To test the suggestion that exercise dependence is parallelled by a tendency towards eating disorders, Pierce, Daleng and McGowan (1993) compared exercise dependence scores of 47 ballet dancers with those from 39 endurance athletes and 16 non-endurance athletes. The hypothesis that dancers would present a higher profile of exercise dependence, was supported.

A recent study by McDonald (1994) revealed that groups with high levels of exercise dependence such as swimmers, do not necessarily experience high eating disturbance. Instead pressures for thinness appeared to be the strongest determinant of eating difficulties. This contradicts the results of the above studies and further research needs to clarify what the link between exercise and eating pathology entails.

The Link Between Excessive Exercise (EXE) and Anorexia Nervosa (AN)

De Coverley Veale (1987) has proposed diagnostic criteria for exercise dependence, assuming that EXE can be viewed as a distinct diagnostic entity. However, the authors' differentiation between primary exercise dependence (with exercise being an end in itself) and secondary exercise dependence (where exercise dependence is secondary to an eating disorder), brings up the question of the link between EXE and AN and is useful as it clarifies the role that exercise plays in both cases.

The relationship between AN and EXE is frequently discussed in the literature and a proposal has been made by Yates et al. (1983) that individuals who engage in a high level of physical activity may have a disorder that is analogous to AN.

Sours (1981) presented a thesis that male obligatory runners resemble anorexia nervosa patients in many respects. To study this, Yates et al. (1983) combined a questionnaire survey with case history reports and compared obligatory runners and eating disordered patients. They drew attention to the fact that certain behaviour patterns and attitudes of the two groups are very similar. Yates et al. (1983) based their argument on the suggestion that the 'drive for fitness' in males serves a similar function as the 'drive for thinness' in females. They have argued that 'obligatory running' is an analogue of AN in males. In the present study this hypothesis will be tested, by comparing the results across gender.

Hsu (1989) stressed that the media primarily exposes women to the 'pressures of thinness'. Instead, cultural pressures encourage a 'drive for fitness' in males (Steiger, 1989). Thus gender differences in the expression of the two conditions were attributed to cultural values of beauty and thinness for women (Russell, 1985; Vandereycken & Meerman, 1984) and athleticism for men (Liberman & Palek, 1984; Sours, 1980).

An article by Yates et al. (1983) was heavily criticized on the grounds of poor methodology, a reliance on extreme individuals who are not a true representation of

the general population of runners, having no pertinent data and overemphasizing the similarities between obligatory runners and anorexic patients (Krelstein, 1983; Larsen, 1983; Stewart, 1983; Wells, 1983). Yates (1983) responded to these critics by stating that his preliminary study suggested further research.

The proposal by Yates et al. (1983), was not supported by Blumenthal et al. (1984), and Blumenthal et al. (1985), who compared anorexic patients and obligatory runners on personality dimensions, finding no psychological resemblance between the two groups. Patients differed from runners on 8 out of 10 Minnesota Multi phasic Personality Inventory subscales (patients scored higher). Runners scored higher on an ego-strength scale. Overall, the runners had normal profiles whereas only 5 out of 24 patients scored within the normal range on the MMPI.

Dresser (1985) criticized the above studies on the grounds that they only investigated personality traits, whereas the original paper by Yates et al. (1983) proposed four areas of similarity in the two groups.

Furthermore, Dresser (1985) stressed the seriousness of the selection bias in the Blumenthal et al. (1984) study. Only well-functioning world class runners (not necessarily addicted runners) were compared to hospitalized anorexic patients. Clearly, anorexics should be compared to obligatory runners.

Le Grange and Eisler (1993) supported the methodological issue that researchers in this area have neglected to distinguish between runners who share no characteristics with anorexic patients and 'obligatory runners', who do. At this point the two groups cannot be equated.

Other studies examined anorexic characteristics in runners. In an empirical study by Owens and Slade (1987), a questionnaire known to relate to personality characteristics associated with anorexia nervosa, was distributed to female marathon runners. Although runners did resemble anorexic patients on a 'perfectionism' scale, their dissatisfaction scores were normal, indicating that they did not suffer as a result. Thus, in conclusion, fundamental similarities between runners and anorexic patients do not exist.

When 125 female runners were compared with college student controls on eating pathology (Weight & Noakes, 1987), no overall group differences were found. An elite marathon subgroup did, however, have high eating pathology scores and it was concluded that running may be a substitute for anorexia nervosa and help some individuals to avoid the full clinical syndrome. In this study the Yates hypothesis, that running is an analog of AN and attracts people with an anorexic personality, was not supported, as the incidence of anorexia in competitive runners was not higher than in the general population.

When examining whether athletes have psychological traits similar to those of anorexic patients, Mallick, Whipple and Huerta (1987) compared females with eating disorders, athletes and students. Results revealed that eating disordered patients had the worst patterns (low self-image, low grades, poor health) and athletes had the best patterns. Overall, athletes did not resemble anorexic patients.

Nudelman (1988) compared female bulimics with male runners and male controls. The runners scored as compulsive exercisers on an obligatory running questionnaire. Male runners scored as more adjusted than patients on eating symptom scales. The author points out that the motivations of the male runners may have been to improve physical effectiveness and enhance performance, while the patients wished to raise their self- esteem and improve their appearance.

Psychological and behavioural differences among female bulimics, obligatory athletes and control subjects were studied by Krejci, Sargent, Forand, Ureda, Saunders and Durstine (1992). The results of this study indicated that the exercisers did not resemble the bulimics. However, the obligatory exercisers differed from non-obligatory controls as they scored higher on eating attitudes, drive for thinness, dieting behaviour and perfectionism. It is suggested that no rationale exists to equate eating and weight issues of exercisers with those of bulimics.

A recent study by Parker, Lambert and Burlingame (1994) examined psychological features of female runners who presented with pathological weight control behaviours. Eating-disturbed runners presented with higher food and diet concerns on Psychological Inventories than non-eating-disturbed runners, but results did not reach eating disordered clinical levels. Significant levels of psychopathology were only evident in an eating disordered comparison group. These results support the previous findings that exercise dependent individuals cannot be compared with anorexics on levels of psychopathology.

To clarify the link between EXE and AN, Eisler and Le Grange (1990) have proposed four models that could explain the possible link between EXE and AN. Firstly, AN and EXE could be viewed as distinct diagnostic entities. In this model, anorexics exercise to lose weight and are called "exercise anorexics". Excessive exercisers, on the other hand, exercise to enhance their fitness levels. According to this model the similarities between EXE and AN are only superficial and they form two distinct groups.

Secondly, AN and EXE could be overlapping groups and EXE could lead to the development of AN. This model proposes a causative link from EXE towards AN and could have important implications for the prevention of eating disorders.

A third model presents the view that AN and EXE could both be related to some underlying disorder, e.g. depression. Anorexia nervosa has often been linked to affective disorder. Similarly, links between EXE and various forms psychiatric disorders have been described. However, this model still needs to be examined as another illness may predispose an individual to develop EXE or AN - this would not adequately explain the link between the two.

Fourthly, EXE could be a variant of an eating disorder. This model implies that common etiological factors may lead to the development of either disorder. It is argued that the two disorders merely have different manifestations and the drive for thinness could lead to AN whereas the drive for fitness could lead to EXE. This model is implicit in Yates et al.'s (1983) argument that EXE in males is analogous

to AN in females. In future, the above models need to be explored, as the literature has not yet successfully explained this link (Le Grange & Eisler, 1993).

According to Yates et al. (1994), both compulsive athletes and eating disordered individuals are persistent, perfectionistic and high-achieving individuals. However, compulsive athletes appear healthier than eating disordered individuals on psychological tests. The authors proposed a' risk-factor model' to explain the link between compulsive athleticism and eating disorders. Individuals would be at risk for overcommitment if they are persistent, perfectionistic, high achieving persons, who are sensitive to cultural values of thinness, fitness or both. These individuals would be at greater risk if they participate in a diet-exercise program. A further risk exists if the body were to be severely stressed through strenuous exertion and a sustained caloric deficit.

Conclusion

As yet, there is no consensus on the link between excessive exercise and anorexia nervosa. General points that emerge from the literature are that individuals who exercise excessively are not similar in many ways on personality or psychopathology with eating disordered patients. Instead, exercise dependent individuals appear to be well functioning people, whereas eating disordered persons are psychiatric patients.

Only extreme cases of excessive exercisers seem to resemble eating disordered patients on the unrealistic drive for thinness, pathogenic weight control behaviours and menstrual irregularities and amenorrhea (Yates et al., 1994).

The literature indicates that excessiveness on either the dieting or exercising dimension can be harmful to an individual.

> *"Like weight control, exercise could be viewed as falling along a continuum from reasonable efforts to maintain fitness to a lifestyle of exercise and preoccupation with fitness that is out of proportion to the expected benefits of exercise".*
>
> (Nudelman, 1988, p. 626).

Research Questions

In terms of future research, Le Grange and Eisler (1993) stressed the importance of operationalizing the 'syndrome' excessive exercise. Clearly standardized psychometric measures are essential for this purpose (Hauck & Blumenthal, 1992).

Only when excessive exercisers can be identified, can comparative studies of 'anorexia nervosa', 'exercise-anorexia' and 'excessive exercise' be conducted (Le Grange & Eisler, 1993).

Although the majority of the literature deals with the increased vulnerability of specific sports (that emphasize thinness) to eating disturbance, Le Grange and Eisler (1993) proposed that eating and exercise attitudes need to be examined in other non-clinical populations who may be at risk of developing anorexia nervosa and/or excessive exercise.

The present study takes such an approach and examines eating pathology and exercise dependence in gym members who are not necessarily subjected to extreme pressures for thinness or for fitness. It was felt appropriate to focus on this group, as they are involved in various types and amount of exercise and could hence provide some insight into the prevalence of eating and exercise pathology in the general population of physically active individuals.

Investigation into this area has a relatively short history and past methodological shortcomings need to be improved. Various authors call for empirical research studies (Eisler and Le Grange, 1990; Krelstein, 1983; Larsen,1983; Wells, 1983). Further research is needed to clarify the relationship between exercise dependence, weight loss and eating disorders.

The observation that the exercise and eating behaviours of many individuals may become dysfunctional, calls for examining the etiology, dynamics and treatment of exercise and eating pathology (Polivy, 1994).

CHAPTER 3

HYPOTHESES

The research question is: What is the link between exercise dependence and eating disturbance? It is expected that female athletes are more susceptible to the development of eating disorders, while male athletes are more prone to exercise dependence.

More specific hypotheses are outlined below:

a) It is hypothesised that disturbed attitudes to exercise and eating will be common in individuals who experience the pressure to be both fit and thin.

b) Model 1 (Eisler & Le Grange, 1990) is tested in this study. Individuals with a marked preoccupation with weight and eating are expected to have higher exercise dependence scores. This would provide support for the concept of secondary dependence, where exercise dependence is seen as being secondary to an eating disorder.

c) The concept of primary dependence, i.e. where exercise dependence is a separate problem to an eating disorder, will be examined by looking at the differences between individuals selected by the Exercise Dependence Questionnaire and the Eating Attitudes Test. This also tests the hypothesis implied in Model 1 (Eisler & Le Grange, 1990).

d) The Yates hypothesis (1983) (that 'obligatory running is an analogue of anorexia nervosa') will be tested by examining anorexic tendencies in exercise dependent individuals. It is expected that the similarities are only superficial.

Further, exercise dependence levels will be compared across gender to test the suggestion that excessive exercise in males is analogous to

Anorexia Nervosa in females. This is implicit in Model 4 (Eisler & Le Grange, 1990).

e) A follow-up study and interviews were included to test Model 2 (Eisler & Le Grange, 1990), which proposes that exercise dependence can lead to Anorexia Nervosa.

f) Another specific hypothesis to be tested is that individuals with a history of weight-cycling are more likely to have disturbed weight and eating concerns. Nelson Steen and Brownell (1990) found that an unstable weight history can intensify weight preoccupation and Kiernan et al. (1992) reported similar trends.

g) Exercise dependence is expected to be higher in individuals who have a poor perception of control over their exercise behaviour.

Assumption

It is assumed that it is meaningful to consider excessive exercise or exercise dependence as a distinct diagnostic category, rather than merely a behaviour that some individuals engage in (De Coverley Veale, 1987). The assumption is that individuals who exercise excessively have something in common other than that they exercise a lot (Eisler & Le Grange, 1990). However, Eisler and Le Grange (1990) pointed out that one needs to bear in mind that when a group of exercise dependent individuals are identified - they need not necessarily be viewed in terms of an illness model as a positive addiction to exercise is not necessarily pathological (Sacks, 1981).

Limitations

This study will not attempt to operationalize "exercise dependence". Although interviews are conducted, their scope is limited in this type of exploratory study. An in-depth interview on a larger sample of individuals is essential for the above purpose.

Motivation for the Study

The question being addressed here is whether or not physical activity contributes to the development of dysfunctional compulsive behaviour in some of those who pursue fitness. It should be remembered that clearly, fitness should not be discouraged as it is beneficial for the majority of the exercising community who engage in moderate, healthy exercise.

The present study is of interest, as it will focus on the general exercising population. Past studies have focused mainly on elite athletes, runners, or specific sports where leanness is emphasized.

In general, the link between excessive exercise and eating disorders will be examined in more detail and some etiological pathways into exercise dependence and eating disorders will be examined by means of interviews.

To sum up: The six aspects of the study

a) Individuals who show a significant degree of exercise dependence will be detected, as the exercise dependence questionnaire assesses the degree of exercise dependence. Of interest is whether there is a link between exercise dependence and eating pathology.

b) Another purpose of the study is to examine gender differences on exercise and eating attitudes and behaviours in a sample of health conscious gym members.

c) Specific hypotheses regarding perceptions of control over exercise and stable vs. unstable weight history are tested.

d) The syndrome EXE will be examined in detail in order to identify what individuals who are exercise dependent have in common, other than exercising a lot.

e) A follow up study will be conducted on 14 individuals, to determine the

natural course of exercise dependence and its relation to eating attitudes over time.

f) Interviews will be conducted on five individuals to obtain descriptive data.

CHAPTER 4

METHODOLOGY

Subjects

To investigate the link between exercise dependence and eating and weight concerns in males and females who are regular exercisers, gym members were asked to participate in the study.

The researcher was granted permission by the managers of the Point Health and Racquet Club, the Cape Town Health and Racquet Club and the Cavendish Health and Racquet Club, to put up a notice with the questionnaires at the exits of these gyms. The notice explained that the study concerned the investigation of eating and exercise attitudes and behaviours. Potential respondents were assured that strict confidentiality ould be maintained. It was left up to the volunteers to leave their names and contact telephone numbers on the questionnaire, in case they wished to be interviewed at some later stage.

A total of 600 questionnaires were distributed over a period of two months and members were invited to voluntarily complete the questionnaires at their own convenience and drop them off in sealed boxes at the reception areas. No subjects were excluded from the study on racial grounds. A study by Rosen, Silberg and Gross (1988), who developed norms for the Eating Attitudes Test and the Eating Disorder Inventory, revealed no significant differences in results between the different racial groups.

Eighty nine subjects (32 males and 57 females) returned completed questionnaires. This reflects a 15 percent return rate, which is lower than in other studies (Alexander, 1994; McDonald, 1994). The reason for this is that in those studies, questionnaires were handed out by coaches or teachers, whereas this study relied on volunteers to take questionnaires home, complete them and return them to the gym. Six questionnaires had not been fully completed and had to be discarded. The females ranged in age from 17 - 50 years ($\bar{X}$ = 29,9; SD = 9,99). The age range for males was 19 - 63 years ($\bar{X}$ = 34,6; SD = 13,3).

Instruments

This study was based on a battery of six questionnaires.

1. *The Dietary History Questionnaire (DHQ)*:

This questionnaire identifies relevant information relating to the subject's present and past dietary history, e.g. the weight cycling history, whether the subject is currently on a weight reducing diet and whether the subject had a history of an eating disorder (see Appendix A).

2. *The Eating Attitudes Test (EAT):*

This is a 40-item self-report instrument which measures symptoms relating to dieting, bulimia nervosa, anorexia nervosa, preoccupation with food, feelings associated with eating and how others pressurise the individual to gain weight.

The possible total score ranges from 0 - 120 as the scale is presented in a 6-point format. Garner and Garfinkel (1979) validated the EAT and showed that a cut-off score of 30 and above differentiates anorexics from normal weight university students. The EAT is a reliable and valid measure of the symptoms of anorexia nervosa (Garner, Olmsted, Bohr & Garfinkel, 1982), although high scores on the EAT are not necessarily diagnostic of an eating disorder.

3. *The Eating Disorder Inventory (EDI):*

The EDI is a 64-item self-report scale that consists of the following eight subscales (Garner, Olmsted & Polivy, 1983).

1. Drive for thinness (DTh): This measures the weight preoccupation, iet concerns and an extreme pursuit of thinness.

2. Bulimia (B): This examines episodes of bingeing (uncontrolled overeating) and subsequent self-induced vomiting.

3. Body Dissatisfaction (BD): This examines dissatisfaction with certain areas of the body (hips, buttocks, thighs) which are associated with shape change at puberty.

4. Ineffectiveness (I): This includes a component which measures negative self-evaluation and also assesses general feelings of inadequacy, insecurity, worthlessness and not being in control of one's life.

5. Perfectionism (P): Is indicative of excessive personal expectations for superior achievement.

6. Interpersonal Distrust (ID): Reflects problems with forming close, intimate relationships, communicating with others and feeling uncomfortable expressing emotions toward others.

7. Interoceptive Awareness (IA): Reflects one's confusion in correctly identifying emotions and bodily sensations such as hunger or satiety.

For the present purposes the first three subscales are the most relevant as they measure weight and diet preoccupation.

The EDI consists of a 6-point Likert scale with a response ranging from 1 ("always") to 6 ("never").The most anorexic score receives a score of 3; the next response, 2; and the next, 1. The three choices on the opposite end of the most anorexic scale receive a 0 each. All the items are added together for each subscale.

The EDI manual provides normative data to guide an evaluation of scoring, but does not allow for a score-based diagnosis of eating disorders (see Appendix A).

Fucht, Wingard and Felice (1988) have determined subscale cut-off points for the first three subscales by subtracting one standard deviation from the means of established scores of anorexic patients (Garner et al., 1983). However, Garner

and Garfinkel (1979) noted that this technique for establishing cut-off scores may allow for "false positives" (i.e. some normal individuals may have eating concerns similar to anorexic patients).

4. *The Exercise Dependence Questionnaire (EDQ):*

The main reason for using this questionnaire is the fact that it measures exercise dependence which is relevant to all forms of exercise. The EDQ was developed and validated by Ogden, Veale and Summers (1993). A total of 449 subjects completed an exercise self-report scale, the Eating Attitudes Test and the Profile of Mood States. Factor analysis was used to discard certain items.

The final version of the EDQ consists of 29 items and the following eight sub-scales:

1. Interference with social/family life. This examines how exercising leads to the neglect of work, family and social life.

2. Positive reward. This examines the positive effects of exercise such as a reduction in depression and anxiety and an increase in self-esteem.

3. Withdrawal symptoms. This reflects feelings of irritability, anxiety and stress on cessation of exercise.

4. Weight control. This indicates whether exercise is used as a method of weight control and attractiveness.

5. Insight. This assesses a person's recognition of the problem of exercise ruling his/her life and the guilt about the amount of exercise.

6. Social reasons. This examines the social aspects of exercise.

7. Health reasons. This focuses on the health benefits of exercise.

8. Stereotyped behaviour. This reflects the routine pattern of exercise involvement.

The above sub-scales showed good internal reliability. Questions are presented along a 7-point Likert scale and the questionnaire is scored by computing a total score and by examining the individual scales.

The EDQ was validated with the EAT and significant differences between low and high EAT scorers on the EDQ support the notion of "secondary dependence", i.e. the EDQ measures a behaviour similar to that found in eating disordered individuals. However, the differences found in the individuals selected by sub-scales of the EDQ and the EAT point to exercise dependence as measured by the EDQ as being a separate problem to eating disorders. The EDQ has numerous advantages over previous scales as it provides a means to evaluate exercise dependence in other populations besides runners.

Additionally, it also examines the relationship between exercise dependence and eating disorders, which is central to this study (see Appendix A).

5. *The Maudsley Obsessional Compulsive Inventory (MOCI):*

The MOCI (Hodgson & Rachman, 1977) consists of 30 items with a True-False rating. It is considered to provide a self-report measure of a number of obsessive-compulsive behaviours. A study by Sternberger and Burns (1990), provided support for the validity of the MOCI in non-clinical samples. For the purposes of this study it was interesting to examine the relationship between obsessive compulsive behaviours and exercise dependence (Appendix A).

6. *A questionnaire compiled by the researcher.*

To enrich the study, this questionnaire consists of open-ended questions to obtain certain qualitative data on the type of exercise involved in and reasons for exercising. It also asks multiple choice questions about one's perceived control about exercise, primary motivation to exercise and perceived health status. In addition, certain Likert-scale type questions examine the drive for fitness and thinness, body image, using exercise as a stress coping mechanism, Type A personality traits and a preoccupation with diet and exercise (see Appendix A).

Statistics

The questionnaire results of each subject were entered onto a spreadsheet.

Furthermore, the Body Mass Index (BMI) = $\frac{\text{Weight (kg)}}{\text{Height}^2 \text{ (m)}}$ was computed

for each subject. A computerized statistical package was used for the analysis. Means and standard deviations were calculated separately for males and females for all the questionnaire results, in order to examine gender differences. One-Way and Two-Way analysis of variance were used to analyse the data (Howell, 1989) and seek statistically significant differences between genders. Chi-squared tests were performed where data were assigned to ordinal categories.

The follow up questionnaires were analysed by means of a t-test for difference scores of a related sample (Howell, 1989).

A significance level of $p<0.05$ was chosen in the interpretation of the statistics.

Interviews

Interviews were conducted on five individuals who had completed a follow-up questionnaire. The aim was to examine exercise dependence in more detail and ask specific questions about the changes that have occurred in exercise dependence over time (see Chapter 6).

CHAPTER 5
RESULTS

Gender comparisons on Demographic Information

Demographic details are presented in Table 1.

The one-way ANOVA clarified that no statistically significant differences exist between the genders with regards to age ($F = 3,58$; $df = 1,87$; $p<0,061$). However, there is a statistically significant gender difference with regards to BMI ($F = 21,83$; $df = 1,87$; $p<0,000$), with the mean for males ($\bar{x} = 24,97$, $SD = 3,01$) being slightly higher than the mean for females ($\bar{x} = 21,84$, $SD = 3,04$).

There was a statistically significant difference in the months of exercise involvement ($F = 6,46$; $df = 1,87$; $p<0,012$). Overall, men have been exercising for much longer ($\bar{x} = 86$ months; $df = 115,2$) than women ($\bar{x} = 42,9$ months; $SD = 42,1$).

Additional qualitative and demographic details will be presented in this section. When reasons for exercise involvement were analysed, it was noted that an equal number of women reported exercising for fitness and health reasons (40,35%) and for weight control and toning the body (40,35%). Two women (3,5%) reported exercising in order to keep fit for another sport, while five (8,77%) reported exercising for medical reasons. Furthermore, two women (8,77%) exercise to relieve stress and two (8,77%) exercise to enhance their sex appeal.

In comparison, the majority of males (53,12%) reported exercising for fitness and health. Nine (28,12%) exercise to tone their body and improve their physique, while two (6,25%) exercise to be fit for other sports. Two (6,25%) exercise because it was medically prescribed. Additionally, one man (3,12%) exercises to build muscles and another one (3,12%) wishes to increase his weight through exercise.

Table 1: Demographic Details

	FEMALES (n = 57)		MALES (n = 32)	
Variable	Mean	SD	Mean	SD
Age (Yrs)	29,9	9,99	34,6	13,3
BMI[1] (kg/m^2)	21,8	3,04	24,9	3,01
Months of Exercise	42,9	42,1	86	115,2
Variable	%	Nr.	%	Nr.
Smoke[3]	15,8	9	15,6	5
Alcohol[4]	68,4	39	75	24
Vegetarian[5]	24,6	14	0	0
Vomiting[6]	14	8	3,1	1
Laxatives[7]	24,6	14	3,1	1
Dieting[8]	42,1	24	9,4	3
Satisfied with weight[9]	22,8	13	46,9	15
History of ED[10]	26,3	15	3,1	1

Notes:
1. Body Mass Index
2. The number of months that the individual has been exercising regularly
3. The individuals who smoke (amount not accounted for)
4. The individuals who drink alcohol (amount and type of alcohol not accounted for
5. The individuals who are vegetarians
6. History of vomiting
7. History of laxative abuse
8. Currently on a weight-reducing diet
9. Satisfied with present weight
10. History of an Eating Disorder

A total of 72 percent of the males and 70 percent of the females engage in both aerobic and anaerobic activities at the gym. Although 19,29 percent of women and 18,75 percent of men only exercise in the gym, many individuals reported doing various types of exercise outside the gym and these are outlined below:

a) Running (women = 15,78%; men = 12,5%)

b) Walking (women = 33,33%; men = 15,62%)

c) Cross training i.e. various activities (e.g. walk, cycle, swim)(women = 17,54%; men= 25%)

d) Tennis (women =5,26% ; men = 12,5%)

e) Horse riding (women = 3,5%)

f) Toning exercises (women = I,75%)

g) Roller blading (women = 1,75%; men = 3,12%)

h) Dancing (women = 1,75%)

I) Squash (men = 3,12%)

j) Soccer (men = 3,12%)

k) Hockey (men = 3,12%)

l) Bowls (men = 3,12%)

It is interesting to note that more men (90,62%) in comparison to women (59,64%) responded that their primary motivation to exercise is for fitness purposes, whereas 40,35 percent of women and only 9,37 percent of men primarily exercise for weight control. A chi-square analysis showed that these are significant differences between males and females (χ^2= 9,5;df =1; p=0.002).

Cultural values of fitness were analysed on a Likert-scale and a Chi-square test showed that there are differences between males and females (χ^2= 17; df = 6;

p=0.08), with a higher percentage of males emphasizing the importance of cultural values of fitness. It is interesting to note that a similar analysis showed no differences on a rating of the cultural values of thinness (χ^2=10.9; df=6; p=0.08). It would have been expected that women emphasise the cultural values of thinness more than men do.

Body image was assessed on a 7-point Likert scale from 1 (Very negative) to 7 (Very positive). The mean score for women was 3,9, with a standard deviation of 1,46. Males had a mean of 4,6 and a standard deviation of 1,17. A statistically significant difference was obtained on this body image scale (F = 6,3; df = 1,87; p=0,014), indicating that men have a more positive body image. When asked what they specifically did not like about their body, the following eight different responses were given by individuals:

a) Hips and buttocks - Females (12,28%); Males (3,12%)

b) Shape of the legs - Females (22,8%); Males (n=0)

c) Signs of ageing - Females (1,75%); Males (3,12%)

d) A flabby overweight body - Females (22,8%); Males (9,37%)

e) Not sufficient muscle definition - Females (22,8%); Males (9,37%)

f) The stomach area is too flabby - Females (1,75%); Males (12,5%)

g) Being underweight - Females (n=0); Males (12,4%)

31,57 percent of women and 43,75 percent of males were not specific when answering this question.

Subjects were asked whether exercise made them feel better about their body. This scale ranged from 1 (Strongly disagree) to 7 (Strongly agree) and the mean for males ($\bar{X}$ = 6,186, SD = 1,05) was similar to the mean for females ($\bar{X}$ = 6,246, SD = 1,04), indicating that there is strong agreement that exercise makes one feel better about one's body. A one-way ANOVA revealed that no statistically significant

difference existed between the genders (F = 0,15; df = 1,87; p=0,69).

The perceived health status of the subjects was categorized and the majority of the sample - 64,91 percent of females as opposed to 65,62 percent of males, rated their health to be very good; 33,33 percent of females and 31,25 percent of males perceived themselves moderately healthy. Only one woman (1,75%) and one man (3,12%) considered their health to be poor.

Smoking and drinking alcohol were included as general health behaviours and there were no noticeable differences between men and women. Smoking was reported by 15,6 percent of men and 15,8 percent of women, while 75 percent of the males and 68,4 percent of the females reported occasionally drinking alcohol.

Certain elements of exercise dependence were assessed on a 7-point scale. Feelings of guilt when unable to exercise, was assessed on a 7-point scale ranging from I (Never guilty) to 7 (Always guilty). The average rating for females ($\bar{x}$ = 4,56) was marginally lower than the average score for males ($\bar{x}$ = 5,43) and the gender differences reached a significant level (F = 4,2; df = 1,87; p=0,04).This indicates that men tend to feel more guilty than women when unable to exercise.

No significant differences were noted (F = 0,22; df = 1,87; p=0,64) when subjects were asked whether they exercise in spite of illness or injury. The mean for males ($\bar{X}$ = 3,03) was slightly lower than the mean for females ($\bar{X}$ = 3,22) on a 7-point Likert scale ranging from I (Never) to 7 (Always), indicating that individuals don't rate themselves likely to exercise when it is medically contraindicated. Mental preoccupation with exercise revealed no significant difference between males ($\bar{X}$ = 3,3) and females ($\bar{X}$ = 3,8)(χ^2 =8,2; df=6; p= 0,21).

However, when a similar scale assessed mental preoccupation with dieting, a significantly higher mean score for females ($\bar{X}$= 4,22) was noted (Male $\bar{X}$ = 2,8) (χ^2 =21; df=6; p=0,0016). This supports the contention that females tend to me more preoccupied with dieting than males.

No significant gender differences were noted when a score was obtained on a Likert scale ascertaining whether exercise was used as a stress coping mechanism (male $\bar{X}$ = 4,71, SD = 1,83; Female $\bar{X}$ = 5,21, SD = 1,54). It is noted that the importance of exercise as a stress-coping mechanism is acknowledged by the subjects.

Likert scales assessing personality variables were included in the study. Subjects rated themselves on a 7-point scale on Type A personality and perfectionism. Males obtained a significantly higher score ($\bar{X}$ = 4,8) than females ($\bar{X}$ = 4) on perceived Type A personality ratings (F=4,8; df=1,87; p=0,03), but the perfectionism scale showed no statistically significant difference between males and females (F = 0,01; df = 1,87; p=0,92).

Stable vs. Unstable weight history

According to Thomas (1991), if the lowest reported adult weight is 15 perecent or more below the current reported weight, or if the highest reported adult weight is 15 percent or more above the current reported weight, an individual is classified as having an unstable weight history.

The analysis in this study revealed that 27 males (84,37%) and 30 females (52,63%) had a stable weight history, whereas five males (15,62%) and 27 females (47,36%) had an unstable weight history. A chi-square test indicated that gender differences are significant (χ^2 = 8,968; df = I ; p=0,0027).

More females are presenting with an unstable weight history. An unstable weight history is expected to negatively influence body image. Thomas (1991) found that women with an unstable weight history indicated greater dissatisfaction with the shape and size of their bodies and had higher eating concerns.

In light of the above it is interesting to note that no significant differences were detected between individuals with a stable vs. unstable weight history on a self-report measure of body image (χ^2 = 7,534; df = 6; p=0,2743). To examine the effects of an unstable vs. stable weight history on eating concerns, a two-way

ANOVA was conducted. Results revealed no significant differences ($F = 0,02$; $df = 1,87$; $p=0,8814$). The mean EAT score for individuals with a stable weight history ($\bar{X} = 20,87$) was marginally lower than the mean EAT score for those with an unstable weight history ($\bar{X} = 21,34$). This finding contrasts the results of a study by Kiernan et al. (1992), where a history of weight cycling was associated with symptomatic EAT scores.

A chi-square test did indicate that more females (42,1%) than males (9,37%) are presently on a weight reducing diet ($\chi^2 = 10,38$; $df = I$; $p=0,0013$). Furthermore, only 22,8% of women are currently satisfied with their weight in comparison with 46,87% of males.

No differences were found between males and females when vomiting was analysed as a means of weight control ($\chi^2 = 2,68$; $df = I$; $p=0,10$), but more females (24,56%) than males (3,12%) abuse laxatives ($\chi^2 = 6,72$; $df = I$; $p=0,0095$).

Individuals with a History of an Eating Disorder

Fifteen women reported currently or having previously suffered from an eating disorder. One male subject reported having suffered from an undiagnosed eating disorder from age 10, but gave no details. His body mass index was 28,9.

Table 2 represents the 15 female subjects who reported having either previously or are presently suffering from an eating disorder and indicates that nine women have a BMI that falls into the normal range i.e. $20 \leq BMI \leq 25$. The BMI of five women fell under 20, while one woman's BMI is marginally above 25.

Two women suffer from secondary amenorrhea. The most compelling hypothesis is that intensive exercise reduces body weight and puts women below a body fat threshold necessary for regular menstruation (Frisch & McArthur, 1974).

It is interesting to note that as many as ten women never had their eating problem diagnosed. This appears to be a common problem. As a result it is important that physicians should be able to recognize the signs of pathogenic weight control and take remedial steps for early intervention (Kotze and Labadarios,1990).

Table 2 : Individuals with a history of an Eating Disorder

Subject	Disorder	Diag-nosed	Duration (Years)	Age of Onset	Menstruate	BMI
1	BN	YES	12	16	YES	19.71
2	AN	NO	18	10	YES	21.87
3	AN & BN	YES	1	21	YES	17.30
4	AN	NO	12	24	YES	21.08
5	AN	NO	20	16	YES	18.42
6	BINGEING	NO	40	5	YES	24.8
7	AN	NO	8 mnths	26	YES	21.38
8	AN	NO	10	20	YES	23.34
9	AN	NO	1	19	NO	25.4
10	BN	NO	1	21	YES	24.9
11	BINGEING	NO	18	13	YES	23.03
12	AN	YES	24	15	YES	22.68
13	BN	YES	4	18	YES	21.63
14	AN	YES	5	16	NO	17.31
15	AN	NO	2	15	NO	14.52

NOTES: BN = Bulimia Nervosa
AN = Anorexia Nervosa
BMI = Body Mass Index

The results of the questionnaires

The means and standard deviations of the scores on the EAT, EDI total score, the relevant subscales (Dth, BU, BD), the MOCI, the EDQ and all eight subscales appear in Table 3, for males and females separately.

Furthermore, the percentage and number of subjects who score above the cut-off values for the EAT, and Dth, BU and BD subscales are listed.

Table 2 shows that 28 percent of females compared with 15 percent of males scored above the EAT cut-off point, indicating that more women are at risk of developing eating disorders. Similarly, as many as 30 percent of women score above the Drive for Thinness cut-off point as opposed to only 6,2 percent of males. Sixty-percent of women, but only 31 percent of males, scored above the cut-off on the Body Dissatisfaction scale. This difference emphasizes that women have more concerns about their body shape and are more dissatisfied with their bodies.

A one-way ANOVA revealed that there is no statistically significant difference between gender on the total EAT score ($F = 3,57$; $df = 1,87$; $p=0,062$), with the female mean scores ($\bar{X} = 23,12$; $SD = 14,971$) being slightly higher than the male mean scores ($\bar{X} = 17,34$; $SD = 11,51$). The one-way ANOVA performed on the EDI's Drive for Thinness Subscale, however, revealed a significant gender difference ($F = 9,59$; $df = 1,87$; $p=0,0026$), with the mean score for females ($\bar{X} = 6,7$; $SD = 6,4$) being much higher than the mean score for males ($\bar{X} = 2,7$; $SD = 4,3$).

For the Bulimia subscale of the EDI no statistically significant differences between males and females were detected ($F = 2,7$; $df = 1,87$; $p=0,1039$). Results of the one-way ANOVA conducted on The Body Dissatisfaction Subscale did indicate that the mean for females ($\bar{X} = 12$; $SD = 8,2$) was significantly higher than the mean for males ($\bar{X} = 5$; $SD = 4,7$) and the difference was statistically significant ($F = 19,27$; $df = 1,87$; $p=0,000$) (see Figure 2).

Table 3: The Results of the Questionnaires

	FEMALES				MALES			
	MEAN	SD	CUT-OFF	% ABOVE CUT-OFF	MEAN	SD	CUT-OFF	% ABOVE CUT-OFF
EAT	23,12	14,97	30	28% (n=16)	17,34	11,5	30	15% (n=5)
EDITOT	39,14	26,5			26,15	18,14		
Dth	6,71	6,41	10	30% (n=17)	2,78	4,33	10	6,2% (n=2)
BU	2,2	3,93	4	17% (n=10)	1,03	2,3	4	6% (n=2)
BD	12,01	8,29	7	60% (n=34)	5	4,75	7	31% (n=2)
MOCI	7,3	4,21			8,56	5,19		
EDQ Tot	112,9	24,15			115,9	21,6		
EDQ 1	13,98	6,09			13,9	5,99		
EDQ 2	21,12	5,35			22,7	4,65		
EDQ 3	16,5	5,9			17,25	6,38		
EDQ 4	18,9	5,56			13,28	5,78		
EDQ 5	7,01	3,03			7,40	4,27		
EDQ 6	6,89	3,59			7,9	3,97		
EDQ 7	17,42	2,92			18,34	2,88		
EDQ 8	9,89	3,17			10,5	3,37		

Key:
EAT = Eating Attitudes Test
EDITOT = Total Score on Eating Disorder Inventory
Dth = Drive for Thinness Subscale
BU = Bulimia Subscale
BD = Body Dissatisfaction Subscale
MOCI = Maudsley Obsessional Compulsive Questionnaire
EDQtot = Exercise Dependence Questionnaire Total Score

EDQ1 = 1st Subscale on EDQ - Interference with social/family life
EDQ2 = 2nd Subscale on EDQ - Positive Reward
EDQ3 = 3rd Subscale on EDQ - Withdrawal Symptoms
EDQ4 = 4th Subscale on EDQ - Weight Control
EDQ5 = 5th Subscale on EDQ - Insight
EDQ6 = 6th Subscale on EDQ - Social Reasons
EDQ7 = 7th Subscale on EDQ - Health Reasons
EDQ8 = 8th Subscale on EDQ - Stereotyped Behaviour

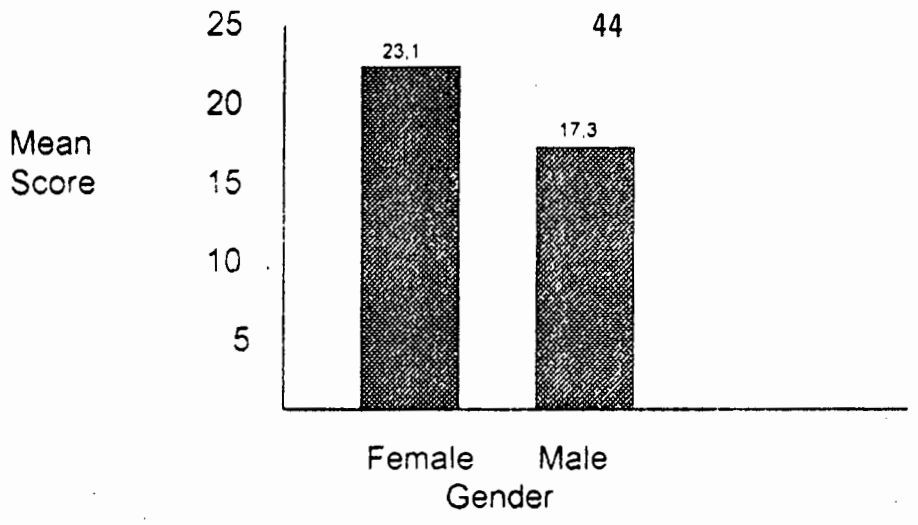
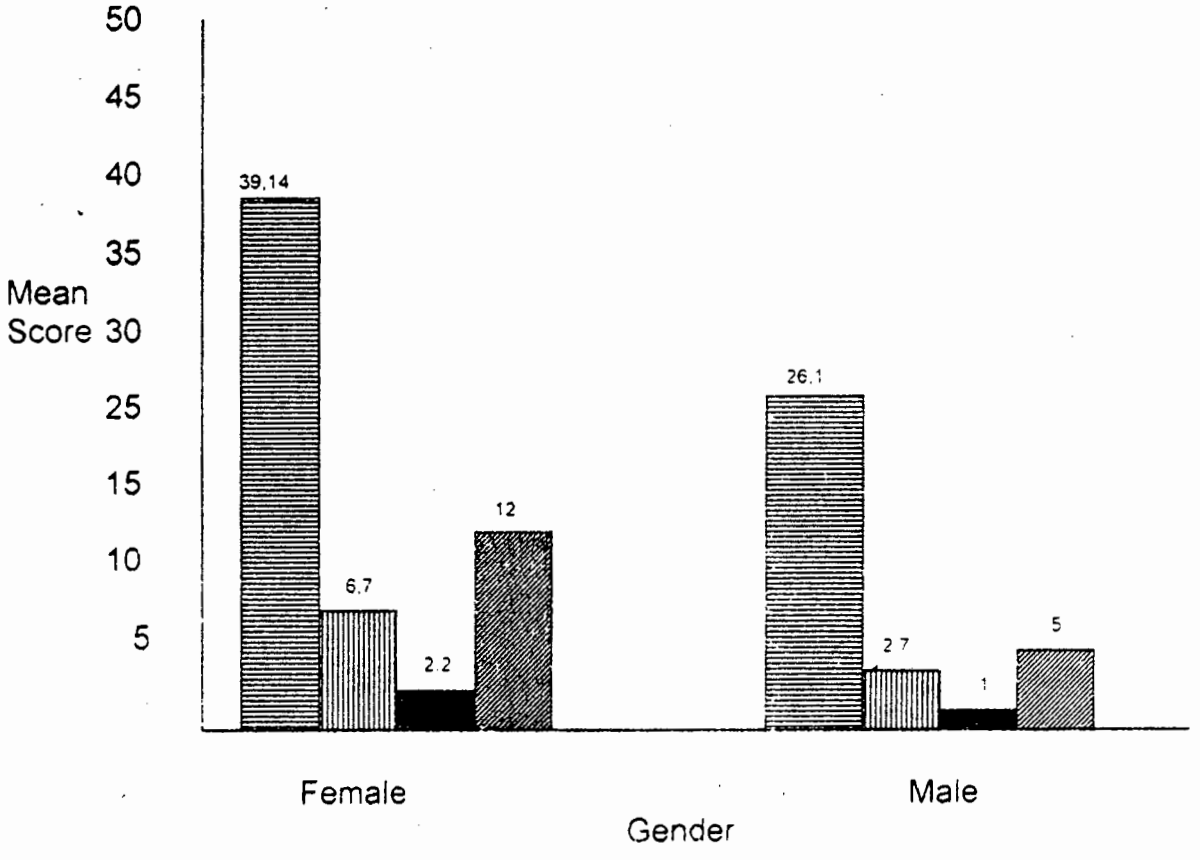


Figure 1: Gender comparison of EAT mean scores



Key

EDI Total

Drive for Thinness

Bulimia

Body Dissatisfaction

Figure 2: Gender comparison of EDI mean scores

The Ineffectiveness subscales of the EDI showed that the mean for females ($\bar{X}$ = 3,64; SD =4,37) was significantly higher than that for males ($\bar{X}$ = 1,09; SD = 3,1). Furthermore, the Perfectionism subscale revealed a significantly higher mean score for males ($\bar{X}$ = 7,8; SD = 3,9) than for females ($\bar{X}$ = 5,15; SD = 4,3) and on the remaining three subscales 'Interpersonal Distrust', 'Interospective Awareness' and 'Maturity Fears' no significant gender differences were obtained.

The one-way ANOVA indicated that females scored significantly higher (F = 6,05; df = 1,87; p=0,0159) than males on the EDI total score, where the mean for females ($\bar{X}$ = 39,14; SD=26,5) was substantially higher than that for males ($\bar{X}$ = 26,1 5; SD = 18, 14).

The one-way ANOVA did not reveal any significant gender differences on the MOCI (F = 1,43; df = 1,87; p=0,234) with the mean for males ($\bar{X}$ = 8,5; SD = 5,1) being marginally higher than the mean for females ($\bar{X}$ = 7,351; SD = 4,2). In comparison with the original validation study by Hodgson and Rachman (1977), who reported an MOCI mean of 18,86 for obsessional patients, these results reflect low obsessional tendencies. The results are similar to results of a study by Chan (1990), who reported a mean of 9.53 on the MOCI total scale for normal subjects.

A one-way ANOVA performed on the EDQ revealed no significant gender differences (F = 0,33; df = 1,87; p=0,54). The male mean score ($\bar{X}$ = 115,9; SD = 21,6) is marginally higher than the female mean score ($\bar{X}$ = 112,9; SD = 24,1). The first subscale, 'Interference with social/family life' showed no significant gender differences. The mean for males ($\bar{X}$ = 13,906; SD = 5,9) was almost identical to the mean for females ($\bar{X}$ = 13,982; SD = 6).

Consistent with the above result, was the males' slightly higher (F = 2,15; df = 1,87; p=0,1459) mean score on the second subscale ('Positive reward') and the males' marginally higher (F = 0,3; df = 1,87; p=0,58) mean score on the third subscale

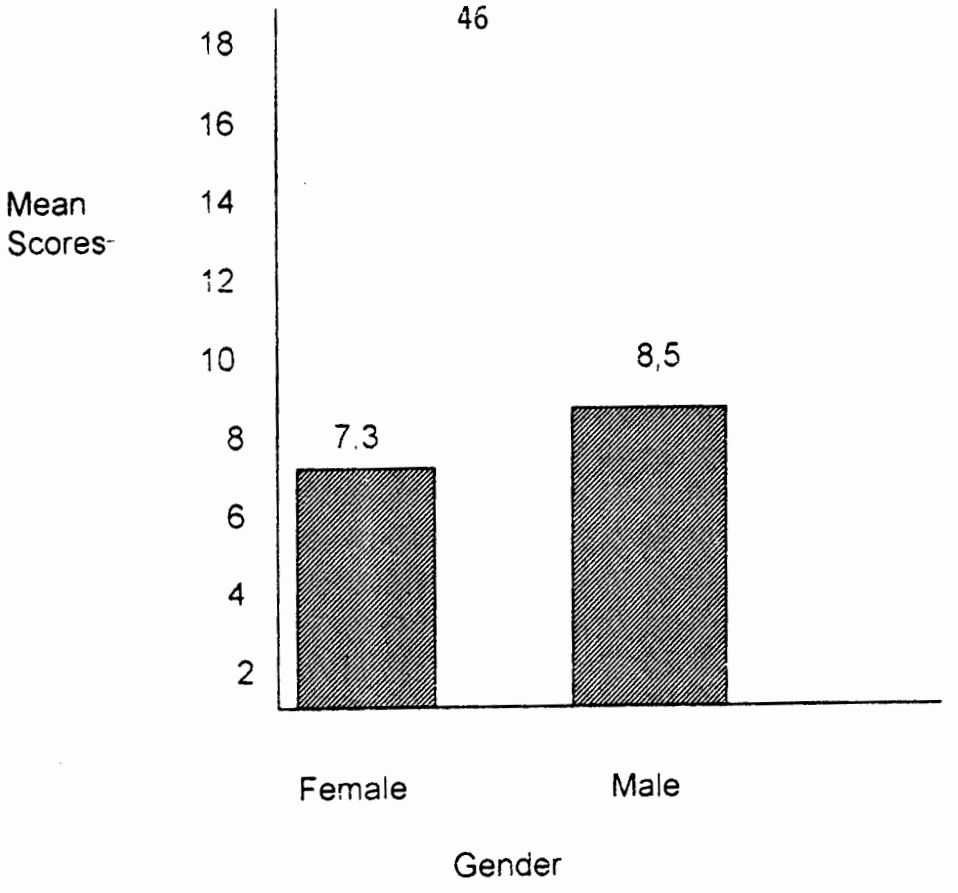


Figure 3: Gender comparison of MOCI mean scores

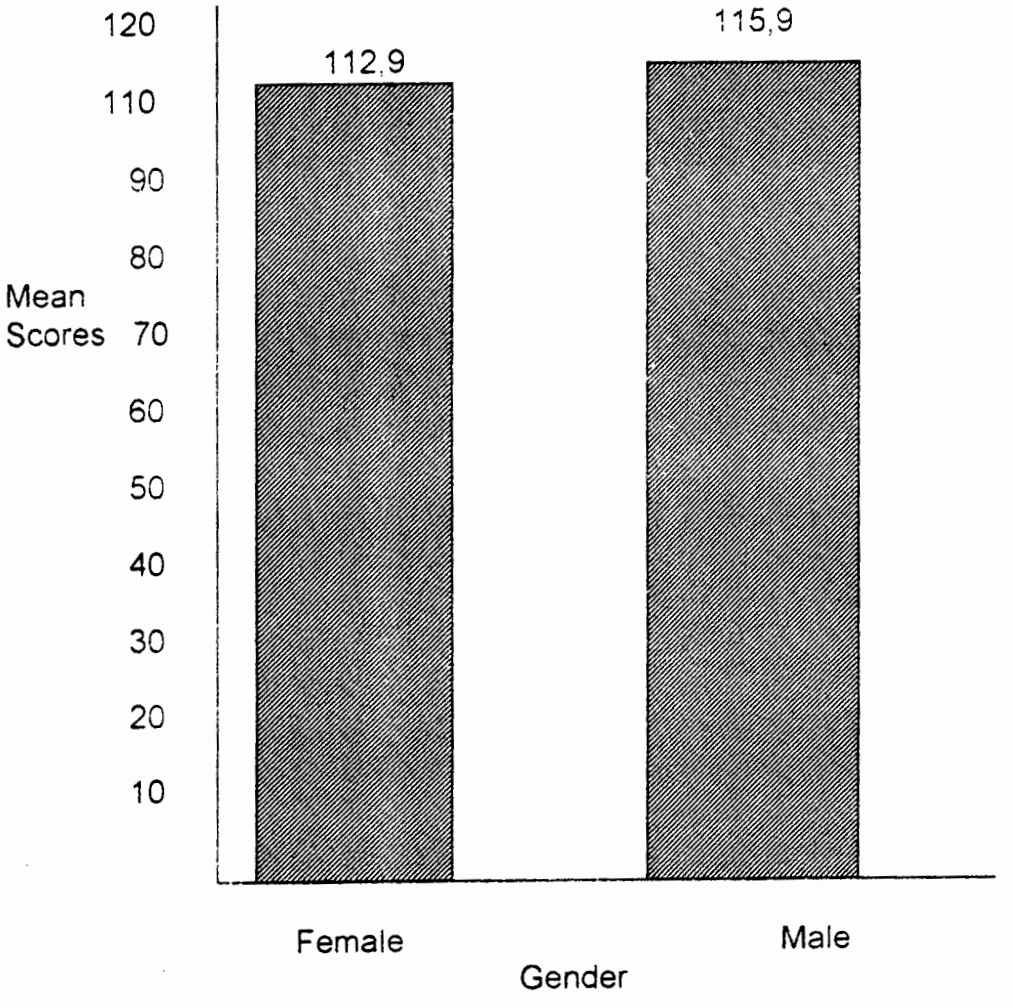


Figure 4: Gender comparison of EDQ mean scores

('Withdrawal symptoms'). The fourth subscale ('Weight control') did however reveal a significant difference between the mean score for females ($\bar{x}$ = 18,1; SD = 5,5) and the mean score for males ($\bar{x}$ = 13,2; SD = 5,7) (F = 15,5; df =1,87; p=0,002) indicating that women are more likely to exercise for weight reduction and control. The fifth subscale ('Insight') revealed no gender differences (F = 0,25; df = 1,87; p=0,619), nor did the sixth subscale('Social reasons') (F = 1,51; df = 1,87; p=0,2232) or the seventh subscale ('Health reasons') (F = 2,06; df = 1,87; p=0,1549), or the eight subscale ('Stereotype behaviour') (F = 0,71; df = 1,87; p=0,4016) with males scoring marginally higher in each subscale.

The Scores of High and Low EAT Scorers on the EDQ

A two-way ANOVA was conducted to assess whether significant differences exist between high and low EAT scorers on the EDQ. Significant differences were detected (F = 3,16; df = 10,78; p=0,0019) between high and low EAT scorers.

For example, people who scored 5 on the EAT, scored an average of 87 on the EDQ. Those who scored 20 on the EAT, averaged 113,8 on the EDQ. Those scoring 35 on the EAT, averaged 131,5 on the EDQ and those scoring 50 on the EAT, averaged 146 on the EDQ. This indicates that people who have abnormal concerns about eating behaviour tend to have a higher degree of exercise dependence or vice versa.

In support of the above, another two-way ANOVA was conducted and the cut-off point of 30 was used for the EAT. Individuals scoring lower than 30 were compared with those scoring above 30 on the EAT score. The mean for those scoring above 30 on the EAT ($\bar{x}$ = 132,2) was substantially higher than the mean for those scoring below 30 on the EAT ($\bar{x}$ = 108,36) (F = 20,8; df = 1,87; p=0,00).

The Scores of High and Low EDQ Scorers on the EAT

Conversely, a two-way ANOVA indicated that significant differences exist between high and low EDQ scorers on the EAT (F = 3,24; df = 11,77; p=0,0011). Individuals who scored high on the EDQ tended to score higher on the EAT. This may indicate

that a high degree of exercise dependence may lead to heightened concerns about weight and eating, specifically as this relationship also held true for males.

Further, a specific comparison was made between individuals who scored in the highest quartile and those who scored in the lowest quartile of the EDQ, on the total EAT score. The two-way ANOVA revealed ($F = 10,61$; $df = 2,86$; $p=0,0001$) a significant difference between the two groups. The mean of the EAT was l0,69 for individuals scoring in the low quartile of the EDQ, and as high as 26,5 for those scoring in the highest quartile of the EDQ.

Consistent with this result is the significantly higher score ($\bar{X} = 8,4$) of individuals who scored in the high quartile of the EDQ, on the Drive for Thinness subscale of the EDI. Those who scored in the low quartile of the EDQ, scored a mean of 1,7 on this subscale ($F = 8,12$; $df = 2,86$; $p=0,0006$). This indicates that a higher level of exercise dependence is associated with a high drive for thinness. No differences ($F = 2,97$; $df = 2,86$; $p=0,0006$) were found between the two groups on the Bulimia subscale of the EDI, but a significant difference was noted on the Body Dissatisfaction subscale of the EDI ($F = 3,23$; $df = 2,86$; $p=0,04$), where the mean for individuals who scored in the high quartile of the EDQ ($\bar{X} = 10,9$) was much higher than the mean for those scoring in the low quartile of the EDQ ($\bar{X} = 5,9$). This indicates that exercise dependence is associated with high levels of body dissatisfaction.

On the Ineffectiveness subscale of the EDI, no differences between high and low EDQ scorers were found ($F = 2,5$; $df = 2,86$; $p=0,08$). However, those scoring in the high quartile of the EDQ had a significantly higher perfectionism subscale score ($\bar{X} = 8,4$) than those scoring in the low quartile of the EDQ ($\bar{X} = 5,0$). The difference reached statistical significance ($F = 4,3$; $df = 2,86$; $p=0,016$) and supports findings by Yates et al. (1994), who detected perfectionistic tendencies in exercise dependent individuals that compared with those of eating disordered individuals.

Similarly, on the Interpersonal Distrust subscale of the EDI, high EDQ scorers had a

relatively higher mean ($\bar{x}$ = 4,5) than low EDQ scorers ($\bar{x}$ = 1,7)(F = 3,9; df = 2,86; p=0,023). The Interoceptive Awareness subscale of the EDI also revealed that significant differences exist (F = 5,7; df = 2,86; p=0,004) as the mean of the low EDQ scorers was 1,1 and the mean of the high scorers, 4,6. No differences were found on the Maturity Fears subscales of the EDI (F = 0,17; df = 2,86; p=0,84).

Details on Individuals with a High Degree of Exercise Dependence

Individuals who scored in the top quartile (top 25%) of the Exercise Dependence Questionnaire Total Score, were identified has having the highest degree of exercise dependence. They were 22 individuals (males = 9; females = 13), who scored 129$\geq$171 on the EDQ. Their reason for exercising was analysed. Eight individuals (36,36%) reported exercising for fitness and health. Ten individuals (45,45%) exercise to enhance their physical appearance, one (4,54%) does so for body building, two (9,09%) wish to improve their sex appeal and one (4,54%) wishes to gain weight. This indicates that a high degree of exercise dependence may be associated with different motivations to exercise.

The majority of these individuals (77,27%) mostly engage in both aerobic and anaerobic activity (n = 17). Two (9,09%) reported engaging only in aerobic exercise, one (4,54%) only in anaerobic exercise and two subjects (9,09%) do weight lifting.

The average score on the MOCI was 9,4 for these 22 individuals, which indicates that exercise dependent individuals do not necessarily have obsessive-compulsive tendencies. This compares with the mean MOCI score of 9,53 for normal subjects (Chan, 1990).

Self-report personality trait assessments revealed that these individuals rated themselves rather high on Type A personality dimensions ($\bar{x}$ = 5,3) and perfectionism ($\bar{x}$ = 5,7) on a 7-point scale. Although results were based on subjective ratings, this provides some support for the contention that perfectionistic

people with Type A tendencies are prone to become exercise dependent.

On average, these subjects exercise 8,3 hours per week, which indicates a certain degree of excessive exercising i.e. the amount of exercise that they do.

As many as seven (32%) reported a history of psychopathology in their family or themselves. Three reported a depressive disorder in their mother, one a depression in himself, one a depression in her father and herself, one a personality disorder in the father and one person's grandfather suffered a nervous breakdown. The possible link between depression and exercise dependence needs further examination.

The drive for fitness was assessed on a 7-point scale and the average rating for the 22 individuals was only 3, which suggests that the high level of exercise dependence was not motivated by a drive for fitness, but rather by a drive for thinness, which was indicated by a mean score of 5,6.

These subjects strongly agree that exercise makes them feel better about their body ($\bar{x}$ = 6,7, on a scale from I to 7), that they feel almost always guilty when unable to exercise ($\bar{x}$ = 5,8, on a scale from I to 7), but they only occasionally exercise in spite of injuries or illness ($\bar{x}$ = 4 on a scale from 1 to 7).

They acknowledge the importance of using exercise as a stress-coping mechanism ($\bar{x}$ = 5,1 on a 1 to 7 scale) and their average rating for feeling mentally preoccupied with dieting ($\bar{x}$ = 4,7) was the same as being mentally preoccupied with exercise ($\bar{x}$ = 4,7).

Only three subjects (13,63%) reported exercising more than they would like to (suggesting poor control), eight (36,36%) exercise less than they would like to and eleven (50%) exercise as much as they would like to.

The relationship between exercise dependence and perceptions of poor control over exercise behaviour

On the basis of a multiple choice question, individuals were divided into three groups:

a) I exercise more than I would like to.

b) I exercise as much as I would like to.

c) I exercise less than I would like to.

It was interesting to note that in the total sample, only four people (4,5%) said that they exercise more than they would like to, 43 people (48,3%) said they exercise as much as they would like to, and 42 people (47,2%) exercise less than they would like to.

A chi-square test revealed that no significant differences exist between the three groups (χ^2 = 33,163; df = 22; p=0,059) on the total exercise dependence score. From these results it arises that exercise dependence is not associated with perceptions of poor control over exercise behaviour.

CHAPTER SIX

FOLLOW-UP STUDY AND INTERVIEWS

To allow for the possibility of gaining some further insight into exercise dependence, a follow-up study was conducted on 14 individuals who scored in the top quartile of the EDQ i.e. individuals who were presenting with the highest levels of exercise dependence in this sample. As suggested by Eisler and Le Grange (1990), this type of follow-up study enables one to establish the natural course of the 'disorder' and test pertinent hypothesis, such as whether exercise dependence maintains a separate identity over time or whether it could develop into Anorexia Nervosa.

In addition to the questionnaire analysis, five individuals were interviewed. The interview serves to obtain some detailed descriptions and explanations of the behaviours and attitudes associated with exercise dependence. This technique serves to enrich the quantitative data already available. Advantages of using the interview technique are that it allows for flexibility and probing of interviewee responses (Sachs & Pargman, 1979).

Furthermore, interviews were included in order to test the proposed models by Eisler and Le Grange (1990) (see Chapter 2).

Method

One and a half years after the original data had been collected, 25 individuals who scored in the top quartile of the EDQ were selected for the follow-up. Five people had moved and were thus excluded from this part of the study. The remaining 20 were phoned by the researcher and voiced their willingness to complete another questionnaire. Subsequently, the researcher sent them another copy of the questionnaire and a stamped return envelope. Of these, only 14 individuals returned their completed questionnaires.

Results of the Follow-Up Questionnaires

There were no consistent trends noted in the scores of the EDQ or the EAT, as in some instances the exercise dependence score changed irrespective of a change in the eating attitudes score and vise versa. A statistical analysis was conducted by using a related measures student's t-test that is applied to difference scores (Howell, 1989). The advantages of using a repeated measures design are the reduction of error variance and more power for fewer subjects.

On the Exercise Dependence Questionnaire, the null hypothesis was rejected as the t calc = 2.32 > t crit = 2.16. There was thus a significant difference between the mean EDQ score in 1994 ($\bar{x}$ =140.42), and the mean in 1996 ($\bar{x}$ =129.71). This indicates that exercise dependence levels may decrease over time.

The mean of the EAT increased from 16.11 in 1994 to 21.21 in 1996. The t calc = 0.22 < t crit = 2.16, thus indicating that the null hypothesis is accepted i.e. there are no differences between the means.

Eating attitude scores appeared to remain relatively stable over time and these results suggest that excessive exercise does not lead to the development of eating disorders. Model 2 (Eisler & Le Grange, 1990) is therefore not supported (see Chapter 2).

The above results should be interpreted with caution.

Interviews

The interview schedule is an adapted version of the one by Sachs and Pargman (1979) and appears in Appendix B.

Five subjects were chosen for the interviews (4 women and 1 man), based on the scores of their questionnaires. The researcher was particularly interested in those individuals who had, according to the reflection of their scores, changed with respect to their eating behaviour and exercise dependence. Upon phoning these subjects, they all voiced their interest in participating with further research.

Procedure

The researcher arranged to conduct the interviews at the interviewees' homes.

All interviewees were thanked at the onset for their co-operation, were assured of confidentiality and were informed about the purpose of the follow-up. Subjects were asked how they felt about the questionnaire. Approval was voiced by all, who thought the research was a good idea. They were interested in receiving feedback about the questionnaire, and the researcher assured them that it would be dealt with after the interview had been completed.

Interview questions were related to their feelings about exercising, exercise dependence and how they view the link between exercise dependence and eating attitudes and behaviours. The interviews were recorded to facilitate subsequent analysis.

Results of the Interviews

In some instances it was felt important to elaborate on certain responses, as some very interesting cases were dealt with.

Firstly, interviewees were asked why they exercised. All respondents brought up the issue of weight control and appearance. Similarly, the study by Sachs and Pargman (1979) found that individuals want to stay in shape and keep their weight down. This motivates exercise participation. In this study, it is perhaps best exemplified by one woman, who remarked: 'If I don't exercise, all my muscle will turn into fat - I feel sluggish if I don't exercise'. Another one put it: 'I exercise to look good and keep my weight down.' One man mentioned:'I exercise to improve my quality of life and for basic well being - weight falls under quality of life. There is no social aspect to it'. Three interviewees added that they also exercise to improve fitness levels.

Interviewees were then questioned about the significance of their role as an exerciser versus the other roles in their life. All identified strongly with the role of an exercising individual and viewed this role as integrated with the other roles they

assumed. One woman mentioned: 'It's part of who I am - I would score it 7/10'. Another two women rated it 6/10 and 9/10 respectively, and the latter added: 'Everything else comes secondary'. This indicates how overwhelmingly important exercise is to some individuals. The man noted: 'It's a part of life - you know, quite the same as brushing one's teeth. At the end of the day, if I don't exercise, the day is not the same'.

One woman sees her exercising as benefiting the rest of the family: 'I rate exercise 8/10. As an exerciser I set a good example of discipline to my family. That encourages them to also get up and do something'. She thus integrates her role as a mother and wife with her role as an exerciser. One woman admitted that her role as an exerciser often makes her give up on other activities or even causes her to neglect her family.

General agreement was expressed concerning the importance of exercise in the participants' lives. Without exception, all find it to be extremely important. Again some chose to score it out of 10. One woman answered: '7/10 - I've exercised from childhood'. The man indicated that, 'it is vital!' One woman's focus has changed over the years: 'Exercise is of primary importance to me for about five years or so. Before that I needed to focus on my children. I am a compulsive personality - I get focused on one thing at a time that takes over. Now my life has to fit in around my exercise routine'. In this case other activities are structured around exercising to permit total commitment to exercise.

Next, interviewees were asked about their feelings while exercising. Without exception they responded positively, e.g. 'My mind clears and I switch off completely', or 'It's a way of getting rid of stress - I feel pretty calm'. One woman said: 'I feel energetic, relieved, happier and more relaxed'. Another one pointed out: 'I enjoy it - it gives me time to think - it's my therapy. I walk up the mountain and get oxygen into my system - it's great!'.

A very descriptive account was given by an ex-marathon runner who revealed that much of her attention is focused on the external environment: 'While I exercise I'm on a high. Everything around me is pretty - I tingle all over and can face anything

that comes my way'. This indicates in a sense how empowered this woman feels while exercising.

As Morgan (1979) pointed out, elite runners often associate with their bodily sensations during running, whereas non-elite runners tend to dissociate and think of anything but the pain they feel. The runner in this study tended to dissociate during marathons as she focused on things that happened around her. She mentioned that she never felt any pain at all, and that she did not take time off after running a marathon. Interestingly, she experienced a period of burn-out and was forced to stop running when medical tests revealed that she was anaemic. She subsequently stopped running and now lacks the motivation to get back into a normal exercise routine. Furthermore, she has gained a lot of weight which she feels very unhappy about. This case illustrates that it is extremely important for runners to learn to listen to their bodies to prevent possible overuse injuries and burn-out.

All of the participants emphasized some positive feelings when they have finished exercising, but physically some negative aspects were stated by two respondents. One woman contradicted herself by noting: 'I feel much more alive, but also finished - tired and exhausted'.

Similarly, the man indicated: 'I feel pretty stuffed, but mentally 100% better'. The powerful tool of using exercise as a stress coping mechanism was reflected in the following: 'I feel relaxed and fulfilled - nothing can upset me after an exercise session!'

Reactions of subjects to periods when exercising was not possible reflect the subsequent withdrawal symptoms experienced. These ranged from irritability, restlessness, a bloated feeling, discomfort, guilt, moodiness to feeling fat and sluggish. According to one woman: 'When I plan to have a day off, I love it. However, when time out isn't planned, I eat too much and fret about weight gain. My mood also goes down and I feel I have no purpose - no reason to get up'. Another woman said she feels helpless when she wants to exercise, but cannot.

This leaves her feeling frustrated and miserable. According to one respondent: 'I feel there is something lacking if I don't exercise. Even just a half an hour walk can make me feel better'.

Answers concerning motivational considerations behind exercising were considered, weight and appearance were a priority among respondents. Self-esteem was also noted, e.g. 'it (exercise) makes me feel better as a person'.

Interviewees viewed exercise dependence as ' obsessional behaviour', or 'like a rush - a drug. It's totally addictive,' or 'it is a part of life - like eating'. Respondents were in agreement that exercise dependence appears to develop over a period of six months to one year (of exercising regularly). Sachs and Pargman (1979) also found this to be the general trend.

An interesting case will be illustrated in an attempt to shed some light on the possible negative implications of exercise dependence. Over-involvement in exercise almost destroyed the life of an ex-marathon runner, who admitted that at the time when she used to be driven to run for hours every day, she felt she was losing her family. The division between her family and herself became worse, because she was running continuously. In her words: 'I was too blind to see it. Now I know that breaking down was a good thing. I was losing my family... My husband actually had to sit me down and asked me to make a choice between my running or them'. This illustrates how, in its extreme form, exercise dependence can ruin relationships, as individuals often exercise even when it is socially contraindicated . This woman managed to break the obsessive cycle of exercise, and now she has the time and energy that her family requires.

Participants' reactions on whether their level of exercising affects their eating attitudes and behaviours differed somewhat. Two women noted that the more they exercise, the less they are concerned about their eating. Another one said: 'If I exercise I am likely to be more controlled around what I eat. After all, its a waste - what's the point of eating badly when you have just exercised?'

Overall, there was a greater likelihood for interviewees to emphasize that their

their concern about weight and eating influences their exercise behaviour, e.g. 'if I overindulge, I exercise more', or the ex marathon runner's remark, 'my weight problem drives me to exercise'.

The man put it: 'If I go overboard (normally on a Saturday night), I will spend two hours on a step machine the next morning. I rate that as obsessional behaviour'. All respondents admitted that they engage in 'debting behaviours' which means that a clear relationship between caloric intake and physical activity was established. It refers to the practice of either considering food 'earnt' after strenuous exercise, 'paying' for a meal by exercising afterwards or cutting down food intake if exercise was missed (Touyz et al., 1987).

At this point a further case will be portrayed. An ex-body builder champion spoke quite openly about her struggle with Bulimia Nervosa. She had been incredibly dedicated when she did body building - she never ate anything like biscuits etc. Often she found herself dreaming about food. By denying herself all the 'bad foods' for so long, she developed a serious obsession with food and now eats, 'a serious amount of junk food'. She used to stuff herself with entire cakes and fatty foods to the point of experiencing severe stomach pains. Vomiting was one of the ways of purging. Exercise was another. She had been obsessive about food since childhood and exercise had always served as a means of weight control. In this case, exercise dependence is a secondary feature of an eating disorder and the woman had good insight into the problem.

As has already been noted, the above analysis supports that exercise is used primarily as a weight control mechanism. Interviewees' weight concerns tend to influence their exercise behaviour. One woman put it bluntly: 'If I feel fat I want to exercise - the more I try to lose weight, the more obsessional I am about exercise'. The ex-marathon runner also admitted that weight gain causes her to exercise obsessively.

In the next section, the cases will be outlined in more detail, in an attempt to further explore the link between exercise dependence and eating pathology.

The Specific Cases

By incorporating the results of the questionnaires into the interview, it was possible to give some feedback to the interviewees. To better understand the processes involved, specific details on interviewees' scores and responses will be presented below. For purposes of confidentiality, only initials were used to identify the subjects.

CASE 1

HK (a 38-year old ex-marathon runner) had presented with a definite decrease in eating concerns. Her EAT score fell from 40 in 1994 to 21 in 1996. Her response to this was that she is currently under a lot of stress and therefore eats a lot. Also, her EDQ score had fallen from 142 in 1994 to 112 in 1996. This is because she is no longer training. She used to exercise six times a week, but currently only walks twice a week. Thus for her, less involvement in exercise has resolved her eating disordered tendencies (at least for now).

It is possible to explain these results in terms of the proposed Model 2 of Eisler and Le Grange (1990). This Model proposes that excessive exercise can lead to the development of an eating disorder.

As Kiernan and colleagues (1992) determined, exercise level is important in the development of weight preoccupation. HK had been running competitively and at that time she had managed to starve herself down to 45kg. According to her, she had dieted to enhance her performance. Interestingly, the interview revealed that exercise predated dieting, that she was involved in competitive sport, that her level of exercise was excessive and that physical activity levels increased steadily during periods of weight loss and food restriction. In a study by Davis et al. (1994), an interview analysis indicated that the same factors were evident in anorexic women, for whom exercise is an integral part of the pathogenesis and progression of self-starvation.

The implications of this case example are that individuals who exercise to excess

place themselves at risk of developing anorexia, i.e. physical activity can play a role in the development and maintenance of eating disorders. In HK's case, less exercise involvement had the effect of improving her eating pathology. Additionally, it was interesting to note that her Body Dissatisfaction score has risen from 13 to 18. Weight gain caused her to be less satisfied with her body and she currently wishes to lose 8kg. However, according to her, her diet is fully balanced at the moment.

It is anticipated that she may relapse at some stage. Although her Drive for Thinness score has remained relatively unchanged - it was 16 in 1994 and 17 in 1996, this indicates that she still is very sensitive to cultural values of thinness which puts her at risk of overcommitment (Yates et al.,1994).

Interestingly, her obsessive compulsive score has fallen from 15 to 3 over the last year. This supports the findings of a study by Kagan (1987), who found that frequency of jogging was associated with a higher compulsive personality profile and this implies that exercise possibly fosters compulsive tendencies in certain individuals.

CASE 2

IJ (35 years of age) experienced a definite increase in eating concerns as he has a slight weight problem. His EAT score increased from 16 in 1994 to 31 in 1996. He mentioned having started up a very controlled diet regimen in 1995. He weighs himself every morning and plans every meal carefully. His EDQ score has increased only slightly from 125 to 129. He now exercises seven times a week (he used to exercise only five times per week in 1994). Exercising more has not increased exercise dependency. Also, his reasons for exercising have changed - in 1994 he indicated exercising for weight control, but now he does so for fitness purposes.

To IJ, eating carefully is more important than exercising. His Drive for Thinness score has increased from 6 to 14, reflecting his current weight and eating concerns. Body Dissatisfaction levels have also risen from 10 to 13. This indicates that

exercise dependence levels can remain relatively stable over time and need not necessarily be linked to changes in eating concerns.

CASE 3

EA, (the ex-body builder), finds herself more concerned about weight and dieting because she turned 40 last year. She stated that she had noted certain physical changes and undoubtedly this causes her to be more concerned about weight and diet issues. Her EAT score had increased from 47 in 1994 to 56 in 1996. It appears that her eating attitudes and behaviour have drawn her closer to the development of an eating disorder. Furthermore, her EDQ score increased from 167 to 182. She used to exercise five times a week, but now exercises five times a week in the mornings and four times a week in the afternoons. This reflects a profile of excessive exercise. For her, there is a definite link between eating concerns and exercise dependence.

These results can best be described in terms of Model 1 (Eisler & Le Grange, 1990). EA has a history of Anorexia Nervosa and Bulimia Nervosa and exercise serves the purpose of maintaining a low weight. Her preoccupation with weight and body shape causes her to exercise excessively.

The term 'exercise anorexia nervosa' can describe this case example, as excessive exercising is a prominent feature of the clinical presentation of her eating disorder. In terms of Model 1, anorexia and exercise dependence are distinct diagnostic groups.

Her Drive for Thinness has increased from 11 to 17, pointing to her heightened concerns about her body shape and weight. She wants to lose 2kg and is dissatisfied with her present weight.

Body Disssatisfaction levels remained stable at 17, but reflect a high score (common in eating disordered individuals). Additionally, her obsessive- compulsive score has increased from 9 to 13 which supports Kagan's (1987) findings (see Case 1).

CASE 4

SV (31 years of age) was surprised that her EAT scores had increased (from 13 to 19), while her EDQ score had decreased from 171 to 119. A possible explanation for the above results is that exercise dependence is not necessarily related to the amount of exercise that one engages in, but rather certain psychological components and attitudes toward exercise.

SV's Body Dissatisfaction had fallen from 16 to 4. According to her, 'I exercise more now and am happier with my body. I have a problem with overweight people - I just don't like them'. She would like to lose 2kg but is not dieting at the moment. Her Drive for Thinness levels are low and fell from 4 to 1. These results lower her risks of developing a future eating problem.

CASE 5

CF (21 years old) follows a less structured exercise routine at the moment. Her EDQ score had dropped from 127 to 100. She is now more concerned with other things in her life. As a result of exercising less routinely, CF has become more concerned about her eating habits, and this was reflected in her EAT score, which increased from 45 to 64. She is dissatisfied with her current weight and would like to lose 5kg. Peer pressure affects her - her friends focus single -mindedly on their bodies and their looks. Her Drive for Thinness remained unchanged at 16, and reflects the abovementioned concerns. Body Dissatisfaction scores were stable and rose from 8 to 9. As the cut-off is 7 on this scale, she falls within the risk category.

CHAPTER 7

DISCUSSION

This study supports other research which sho wed a high occurrence of pathological weight control practices in individuals who exercise (Dummer et al., 1987; Hamilton et al., 1985; Hamilton et al., 1986).

Although there were no significant gender differences on the total EAT score, as noted before, significantly more females (28%) than males (15%) scored above the EAT cut-off point. This finding is supported by the relatively high number of female subjects (26,3%) who reported having either previously or presently suffered from an eating disorder. Many authors argue that exercising may lead to weight and diet preoccupation and possibly even clinical eating disorders (Davis et al., 1990; Epling & Pierce, 1988; Katz, 1986; Kron et al.,1978).

When compared with the prevalence figures of 37,7 percent of ballerinas, who had EAT scores at or above the cut-off point of 30 (Garner & Garfinkel, 1980), there appears to be an extremely high incidence of eating pathology in this sample. This is unexpected, as a population of gym members are not considered a high risk group.

The EDI analysis revealed that females scored consistently higher than males on the EDI total score, the Drive for Thinness subscale and the Body Dissatisfaction subscale. This finding is consistent with previous research (Alexander, 1994; Davis & Cowles,1991). It supports the hypothesis that females are likely to present with higher shape, eating and weight concerns than males.

Researchers who have examined gender comparisons for the EDI, found that females scored higher than males on all subscales, except the Perfectionism subscale (Pasman & Thompson, 1988). In this study males also had more perfectionistic tendencies as measured by the Perfectionism scale.

However, no gender differences were detected on the Bulimia subscale, the Interpersonal Distrust subscale, the Interoceptive Awareness subscale or the Maturity Fears subscale.

The fact that more females (42%) than males (9,4%) are currently on a weight reducing diet is possibly a consequence of the higher percentage of women (77%) as opposed to men (53%) who are dissatisfied with their current weight. Men wish to lose an average of 9kg. (7 men on the other hand wish to gain weight). The mean desired weight loss for women is 5kg. Furthermore, fifteen women and only one man had disclosed details of having a present or past history of an eating disorder (see Chapter 5). The above comparison confirms the greater vulnerability of females, as opposed to males, towards eating and weight concerns.

According to this study, there is no association between weight-cycling status, body image and eating pathology. The hypothesis that weight cycling may put athletes and others at risk for excessive weight concerns is thus not supported.

As revealed in the study by Alexander (1994), exercise dependence scores were also negligible across genders in this study. There was, however, a slightly higher mean for males than for females on the EDQ total score and this is consistent with the results of the study by Blumenthal et al. (1984), who used the 'Obligatory Running Questionnaire'.

Results contradict Yates et al's (1983) claim that anorexia in females is analogous to exercise dependence in males. In this study, only the 'weight control' subscale of the EDQ revealed a higher mean score for females ($\bar{x}$ = 18,1), than for males ($\bar{x}$ = 13,2), which supports Davis and Cowles' (1991) conclusion that females are more likely than males to exercise for weight control.

In moving to the central issue in this study, it is suggested that a link exists between exercise dependence and eating pathology. This finding is consistent with previous research (Alexander, 1994; McDonald, 1994; Ogden et al.,1993).

The contention of 'secondary exercise dependence' is supported (Ogden et al.,1994), as significant differences were found between high and low EAT scorers on the EDQ. This can be concluded, as validation with the EAT indicated that the EDQ measures a behaviour which is similar to that found in eating disordered individuals (Ogden et al., 1993).

The claims of Yates et al. (1983), that obligatory runners and anorexics share some form of psychopathology, was to some extent supported as exercise dependence was related to elevated scores on Body Dissatisfaction and Drive for Thinness. This runs contrary to the investigation by Davis and Fox (1993), who found that excessive exercise was associated with a decrease in body dissatisfaction. In this study it is thus revealed that exercise dependence is associated with certain negative psychological characteristics.

Some comments of interviewees shed light on the possible negative implications of exercise dependence, including withdrawal symptoms upon cessation of activity or giving up on other interests to find tome to exercise.

Generally, however, exercise appeared to fulfil essential purposes such as stress management, enhancing self-esteem and general well-being. In a position statement by the International Federation of Sports Medicine (1990) these physical fitness benefits were emphasized. Certainly this supports a vast area of research, which focuses on the psychological benefits of engaging in physical activity (International Society of Sport Psychology Position Statement, 1992).

It is important to emphasize that moderate, regular activity has many health benefits and should be encouraged. Interestingly, none of the interviewees mentioned exercising for their physical health, such as for the prevention

coronary heart disease, osteoporosis, hypertension or diabetes. Exercise dependence does not appear to be linked with health concerns. The interviews revealed that individuals have good insight into being exercise dependent, and are in control of their exercise behaviour. Further, exercise dependence appears to develop over a period of six months to one year and then becomes as much a part of an individuals' life as eating or sleeping.

Additionally, individuals with a high exercise dependence score did not present with elevated obsessive-compulsive personality traits. The existence of personality traits among athletes that may increase their susceptibility to exercise addiction, has not been established (Hauck & Blumenthal, 1992).

Individuals with a high level of exercise dependence also had tendencies to be perfectionists, to be high on interpersonal distrust and appear to have problems with interoceptive awareness, such as identifying bodily sensations or emotions.

Conclusion

Some tentative conclusions can be drawn from this study. The proposed models by Eisler and Le Grange (1990) will be utilized in the interpretation.

Model 1 (outlined in Chapter 2), where anorexia nervosa and exercise dependence are proposed to form distinct diagnostic groups, best described case study 3 - a case of 'exercise anorexia'. Findings that high levels of exercise dependence were linked with eating disturbance also support this model i.e. that exercise dependence is secondary to eating pathology.

Model 2 (Eisler & Le Grange,1990), in which exercise dependence and anorexia nervosa are overlapping groups and excessive exercise can lead to the development of an eating disorder, appears to have been the underlying process as revealed in case study 1. It implies that participation in sport may enhance compulsivity (which is manifested in exercise dependence), and foster a heightened concern with weight and eating (Davis et al., 1990).

Model 3 proposes that some underlying disorder is related to excessive exercise and anorexia nervosa. It was found that as many as 32% of those identified as presenting with the highest level of exercise dependence reported some form of psychopathology in their family or themselves (mainly affective illness). Further data is needed to clarify the link between excessive exercise and other disorders, as the link may merely indicate that individuals with a predisposition to a depressive illness are more vulnerable to the development of other disorders (Eisler & Le Grange, 1990). At this point, no definite conclusions can be drawn.

Model 4 (Eisler & Le Grange, 1990) which postulates that excessive exercise is a variant of an eating disorder, is only partly supported in the present analysis. According to this model the pressures for thinness (which are stronger for women) (Szmukler, 1983) may lead to anorexia nervosa in women - this was indeed supported, as women scored higher on the drive for thinness and many more women had either previously or are presently suffering from an eating disorder.

However, this model implies that the high values placed on 'physical prowess' in men leads to excessive exercise only in males. On a self-report measure men did emphasize the drive for fitness more than women did, but no gender differences on exercise dependence were revealed, and Model 4 thus lacks support.

It is concluded that different processes may affect exercise dependence and eating pathology in different individuals. As Eisler and Le Grange (1990) pointed out, the models outlined are not mutually exclusive (see Chapter 2).

The follow-up study confirmed that exercise dependence and eating problems may follow different and often unrelated courses over time. It would appear that individual life stages (such as menopause or puberty), and life circumstances (such as stress) influence exercise and eating patterns over time. This lends support to the 'risk-factor model' (Yates et al.,1994) which postulates that life circumstances

and biopsychosocial factors can lead to either condition, irrespective of gender.

CHAPTER 8

LIMITATIONS

There were possible methodological limitations to the study.

The selection process in this study was not random, as subjects were recruited on a purely voluntary basis. It is possible that a certain type of person was more motivated to complete and return the questionnaire and selection-bias could have mediated against obtaining a true reflection of exercise and eating behaviours in the general population of gym members. Caution should be applied when generalizing these results.

Another factor which limited this study was that exercise dependence is not recognized as a diagnostic entity as yet. A distinction was made between exercise-dependent and non-exercise-dependent individuals on the basis of their obtained score on the Exercise Dependence Questionnaire.

As no established cut-off score exists for the EDQ, a feasible demarcation between the two groups appeared to be a comparison of those scoring in the highest quartile of the EDQ with those scoring in the lowest quartile of the EDQ. Therefore, no individuals with 'clinical exercise dependence' could be identified.

Eisler and Szmukler (1985) urged caution about the over-reliance on the sole use of questionnaires. For this reason, an interview analysis was included in this study.

As the present study lacked a non-exercise control group, normative test data needed to be relied on in the interpretation. It was felt inappropriate to include inactive individuals in the analysis as the study dealt specifically with exercise and diet issues in the physically active.

Another limitation to the present study is that the scoring of questionnaires by the respondents could have been prejudiced, as they were possibly biased towards

appearing health conscious and could have overemphasized their exercise and diet concerns. On the other hand, some individuals with excessive exercise and eating pathology may have chosen not to participate in the study in the first place.

As has already been noted, the generalizability of the sample to the general population is probably limited, because it was expected that the majority of respondents came from middle-class, Caucasian backgrounds. This conclusion can be drawn, in view of the fact that questionnaires were distributed at up-market gyms in central Cape Town.

CHAPTER 9

FUTURE DIRECTIONS

This study constitutes an attempt to cover a broad range of individuals with different behaviour patterns in order not to restrict the analysis to a specific sporting activity.

In keeping with the aim of the study, it was revealed that exercise dependence and eating disorders are linked in a population of gym members. This underlines the importance that not only competitive athletes, but any person who engages in physical activity may be prone to become very focused on his/her exercise and diet and possibly develop an eating problem or exercise dependent behaviour.

Further studies need to look at describing 'exercise dependence' by using the possible diagnostic criteria proposed by De Coverley Veale (1987), and focusing on the general exercising population.

Eisler and Le Grange (1990) suggest that follow-up studies are essential in allowing for hypotheses to be tested.

Although this follow-up study was exploratory in nature, it was useful in illustrating that certain circumstances and life stages can alter the course of exercise dependence and eating disorders over time.

It is important to emphasize that one needs to focus on the individual - every person experiences different pressures that affect eating and exercise behaviours in either positive or negative ways. It is recognized that the risk-factor model (Yates et al., 1994) would best explain the link between compulsive exercise and eating disorders and therefore should be explored further in future research studies.

Finally, from this study it emerges that eating disorders may be more prevalent among the physically active than is currently appreciated. This concern has also been voiced by Myburgh and Noakes (1990). Health professionals need to be cognizant of patients who take their dieting and exercise efforts too far, and intervene before

burnout and possible overuse injuries occur (Thornton, 1990).

This study confirmed that many cases of eating disorders go unrecognized. Physicians need to recognize the connections between disordered eating, amenorrhea and osteoporosis (Nattiv & Lynch,1994).

As psychological liabilities can result from excessive exercise, often as a result of other psychological problems, psychologists need to help the individual to confront the real problems and maintain a healthy exercise program (Anthony, 1991).

Finally, life style issues relating to diet and exercise affect the population at large. Many individuals would benefit tremendously from regular exercise as it has immediate and long-term positive effects on human behaviour (Le Grange, 1993).

In supporting Glasser's (1976) view that exercise dependence is a positive phenomenon, it would be a challenge for future researchers to examine the positive psychological processes behind exercise dependence and possibly determine strategies which facilitate self-control around exercise adherence.

Exercise dependence entails making exercise a lifestyle choice, and as long as the expected benefits outweigh the risks, it may be desirable.

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APPENDIX A: QUESTIONNAIRE

Please complete this form as honestly and as accurately as possible.
All information provided will remain strictly confidential.

Date.....

Name.....

Age.....

Present Address.....

..... Tel No.....

Have you always lived in Cape Town? .....
If not, where did you live? .....
Are you living in a residence?.....

1. Are either of your parents overweight?.....
   Who?.....
   Have they always been overweight?.....

2. Are you a vegetarian?.....
   Do you eat eggs and cheese?.....
   How may eggs per week?.....
   How much cheese per week?.....

3. Do you have an history of an eating disorder?.....
   If yes, was it diagnosed or not?.....
   Nature of disorder.....
   Duration of disorder.....
   At what age did disorder begin?.....

Where applicable:

4. Do you menstruate?.....
   When was your last period?.....
   How often do you menstruate?.....
   When did you first start menstruating?.....

5. Height:.....

6. Weight:.....

7. Do you ever feel faint, dizzy, lack energy?.....
   State which and how often.....

8. Do you ever take diuretics ('water pills')?.....
   How often?..... How many?.....
   Do you ever vomit?..... How often?.....
   Do you ever take laxatives?.....
   How often?..... How many?.....

9. Do you take supplements or vitamins?.....
   If so, name them and quantity/amount taken per day.....
   .....

10. Do you consume alcohol?.....
    If so, what type.....
    How much on weekdays:.....
    weekends:.....

11. Highest Previous Adult Weight.....
    Age at that time.....

12. Lowest Previous Adult Weight.....
    Age at that time.....

13. Are you satisfied with your present weight (yes/no)?.....

14. If no, what weight would you like to be?.....

15. Were you ever overweight as a child or adolescent?.....

16. If yes, did you diet at that time?.....
    Please give brief details.....
    .....
    .....

17. Are you currently on a weight-reducing diet?.....
    If yes, please describe the diet briefly.....
    .....
    .....

NAME: ..... Date: .....

Eating Attitudes Test.

Please place an (X) under the column which applies best to each of the numbered statements. All of the results will be strictly confidential. Most of the questions directly relate to food or eating, although other types of questions have been included. Please answer each question carefully. Thank you.

ALWAYS	VERY OFTEN	OFTEN	SOMETIMES	RARELY	NEVER	
( )	( )	( )	( )	( )	( )	1. Like eating with other people.
( )	( )	( )	( )	( )	( )	2. Prepare foods for others but do not eat what I cook.
( )	( )	( )	( )	( )	( )	3. Become anxious prior to eating.
( )	( )	( )	( )	( )	( )	4. Am terrified about being overweight.
( )	( )	( )	( )	( )	( )	5. Avoid eating when I am hungry.
( )	( )	( )	( )	( )	( )	6. Find myself preoccupied with food.
( )	( )	( )	( )	( )	( )	7. Have gone on eating binges where I feel that I may not be able to stop.
( )	( )	( )	( )	( )	( )	8. Cut my food into small pieces.
( )	( )	( )	( )	( )	( )	9. Aware of the calorie content of foods that I eat.
( )	( )	( )	( )	( )	( )	10. Particularly avoid foods with a high carbohydrate content (e.g. bread, potatoes, rice, etc.)
( )	( )	( )	( )	( )	( )	11. Feel bloated after meals.
( )	( )	( )	( )	( )	( )	12. Feel that others would prefer if I ate more.
( )	( )	( )	( )	( )	( )	13. Vomit after I have eaten.
( )	( )	( )	( )	( )	( )	14. Feel extremely guilty after eating.
( )	( )	( )	( )	( )	( )	15. Am preoccupied with a desire to be thinner.
( )	( )	( )	( )	( )	( )	16. Exercise strenuously to burn off calories.
( )	( )	( )	( )	( )	( )	17. Weigh myself several times a day.
( )	( )	( )	( )	( )	( )	18. Like my clothes to fit tightly.
( )	( )	( )	( )	( )	( )	19. Enjoy eating meat.
( )	( )	( )	( )	( )	( )	20. Wake up early in the morning.
( )	( )	( )	( )	( )	( )	21. Eat the same foods day after day.
( )	( )	( )	( )	( )	( )	22. Think about burning up calories when I exercise.
( )	( )	( )	( )	( )	( )	23. Have regular menstrual periods.
( )	( )	( )	( )	( )	( )	24. Other people think that I am too thin.
( )	( )	( )	( )	( )	( )	25. Am preoccupied with the thought of having fat on my body.
( )	( )	( )	( )	( )	( )	26. Take longer than others to eat my meals.
( )	( )	( )	( )	( )	( )	27. Enjoy eating at restaurants.
( )	( )	( )	( )	( )	( )	28. Take laxatives.
( )	( )	( )	( )	( )	( )	29. Avoid foods with sugar in them.
( )	( )	( )	( )	( )	( )	30. Eat diet foods.
( )	( )	( )	( )	( )	( )	31. Feel that food controls my life.
( )	( )	( )	( )	( )	( )	32. Display self control around food.
( )	( )	( )	( )	( )	( )	33. Feel that others pressure me to eat.
( )	( )	( )	( )	( )	( )	34. Give too much time and thought to food.
( )	( )	( )	( )	( )	( )	35. Suffer from constipation.
( )	( )	( )	( )	( )	( )	36. Feel uncomfortable after eating sweets.
( )	( )	( )	( )	( )	( )	37. Engage in dieting behaviour.
( )	( )	( )	( )	( )	( )	38. Like my stomach to be empty.
( )	( )	( )	( )	( )	( )	39. Enjoy trying new rich foods.
( )	( )	( )	( )	( )	( )	40. Have the impulse to vomit after meals.

PRIVATE AND CONFIDENTIAL - EDI.

Name.....Date.....

Age.....Sex.....

Present Weight.....Height.....

Instructions

This is a scale which measures a variety of attitudes, feelings and behaviours. Some of the items relate to food and eating. Others ask you about your feelings about yourself. THERE ARE NO RIGHT OR WRONG ANSWERS SO TRY VERY HARD TO BE COMPLETELY HONEST IN YOUR ANSWERS. RESULTS ARE COMPLETELY CONFIDENTIAL. Read each question and place an (X) under the column which applies best for you. Please answer each question very carefully. Thank you.

		ALWAYS	USUALLY	OFTEN	SOMETIMES	RARELY	NEVER
1.	I eat sweets and carbohydrates without feeling nervous.	( )	( )	( )	( )	( )	( )
2.	I think that my stomach is too big.	( )	( )	( )	( )	( )	( )
3.	I wish I could return to the security of childhood.	( )	( )	( )	( )	( )	( )
4.	I eat when I am upset	( )	( )	( )	( )	( )	( )
5.	I stuff myself with food	( )	( )	( )	( )	( )	( )
6.	I wish I could be younger	( )	( )	( )	( )	( )	( )
7.	I think about dieting	( )	( )	( )	( )	( )	( )
8.	I get frightened when my feelings are strong.	( )	( )	( )	( )	( )	( )
9.	I think my thighs are too large	( )	( )	( )	( )	( )	( )
10.	I feel ineffective as a person	( )	( )	( )	( )	( )	( )
11.	I feel extremely guilty after over-eating.	( )	( )	( )	( )	( )	( )
12.	I think my stomach is just the right size.	( )	( )	( )	( )	( )	( )
13.	Only outstanding performance is good enough in my family.	( )	( )	( )	( )	( )	( )
14.	The happiest time in life is when you are a child.	( )	( )	( )	( )	( )	( )
15.	I am open about my feelings	( )	( )	( )	( )	( )	( )
16.	I am terrified about gaining weight	( )	( )	( )	( )	( )	( )
17.	I trust others	( )	( )	( )	( )	( )	( )
18.	I feel alone in the world	( )	( )	( )	( )	( )	( )

		ALWAYS	USUALL	OFTEN	SOMETI	RARELY	NEVER
19.	I feel satisfied with the shape of my body	( )	( )	( )	( )	( )	( )
20.	I feel generally in control of things in my life.	( )	( )	( )	( )	( )	( )
21.	I get confused about what emotion I am feeling	( )	( )	( )	( )	( )	( )
22.	I would rather be an adult than a child	( )	( )	( )	( )	( )	( )
23.	I can communicate with others easily	( )	( )	( )	( )	( )	( )
24.	I wish I were someone else	( )	( )	( )	( )	( )	( )
25.	I exaggerate or magnify the importance of weight	( )	( )	( )	( )	( )	( )
26.	I can clearly identify what emotion I am feeling	( )	( )	( )	( )	( )	( )
27.	I feel inadequate	( )	( )	( )	( )	( )	( )
28.	I have gone on eating binges where I have felt that I could not stop	( )	( )	( )	( )	( )	( )
29.	As a child, I tried very hard to avoid disappointing my parents and teachers	( )	( )	( )	( )	( )	( )
30.	I have close relationships	( )	( )	( )	( )	( )	( )
31.	I like the shape of my buttocks	( )	( )	( )	( )	( )	( )
32.	I am preoccupied with the desire to be thinner	( )	( )	( )	( )	( )	( )
33.	I don't know what's going on inside me	( )	( )	( )	( )	( )	( )
34.	I have trouble expressing my emotions to others	( )	( )	( )	( )	( )	( )
35.	The demands of adulthood are too great	( )	( )	( )	( )	( )	( )
36.	I hate being less than best at things	( )	( )	( )	( )	( )	( )
37.	I feel secure about myself	( )	( )	( )	( )	( )	( )
38.	I think about bingeing (overeating)	( )	( )	( )	( )	( )	( )
39.	I feel happy that I am not a child anymore	( )	( )	( )	( )	( )	( )
40.	I get confused as to whether or not I am hungry	( )	( )	( )	( )	( )	( )
41.	I have a low opinion of myself	( )	( )	( )	( )	( )	( )
42.	I feel that I can achieve my standards	( )	( )	( )	( )	( )	( )
43.	My parents have expected excellence of me.	( )	( )	( )	( )	( )	( )
44.	I worry that my feelings will get out of control	( )	( )	( )	( )	( )	( )
45.	I think my hips are too big	( )	( )	( )	( )	( )	( )
46.	I eat moderately in front of others and stuff myself when they're gone	( )	( )	( )	( )	( )	( )

		ALWAYS	USUALLY	OFTEN	SOMETIMES	RARELY	NEVER
47.	I feel bloated after eating a small meal	( )	( )	( )	( )	( )	( )
48.	I feel that people are happiest when they are children.	( )	( )	( )	( )	( )	( )
49.	If I gain a pound, I worry that I will keep gaining.	( )	( )	( )	( )	( )	( )
50.	I feel I am a worthwhile person	( )	( )	( )	( )	( )	( )
51.	When I'm upset, I don't know if I am sad, frightened or angry.	( )	( )	( )	( )	( )	( )
52.	I feel that I must do things perfectly or not at all.	( )	( )	( )	( )	( )	( )
53.	I have the thought of trying to vomit in order to lose weight.	( )	( )	( )	( )	( )	( )
54.	I need to keep people at a certain distance (I feel uncomfortable if someone tries to get too close)	( )	( )	( )	( )	( )	( )
55.	I think my thighs are just the right size.	( )	( )	( )	( )	( )	( )
56.	I feel empty inside (emotionally)	( )	( )	( )	( )	( )	( )
57.	I can talk about personal thoughts or feelings	( )	( )	( )	( )	( )	( )
58.	The best years of your life are when you become an adult	( )	( )	( )	( )	( )	( )
59.	I think my buttocks are too large	( )	( )	( )	( )	( )	( )
60.	I have feelings I can't quite identify	( )	( )	( )	( )	( )	( )
61.	I eat or drink in secrecy	( )	( )	( )	( )	( )	( )
62.	I think my hips are just the right size	( )	( )	( )	( )	( )	( )
63.	I have extremely high goals	( )	( )	( )	( )	( )	( )
64.	When I am upset, I worry that I will start eating.	( )	( )	( )	( )	( )	( )

Exercise Dependence Questionnaire

Age ..... Sex ..... Weight ..... Height .....

We would like to know how much you exercise. Please consider exercise as being any structured activity which increases your heart rate eg. 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 circling the appropriate number for how much it describes your attitude to your own exercise over the past month. Please use the following scale:

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

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 me 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 miss the social life	1	2	3	4	5	6	7

THE MAUDSLEY OBSESSIONAL-COMPULSIVE INVENTORY (MOCI)

(See Appendix 4 for scoring instructions.)

Instructions

Please answer each question by putting a circle around the TRUE or the FALSE following the question. There are no right or wrong answers, and no trick questions. Work quickly and do not think too long about the exact meaning of the question.

1. I avoid using public telephones because of possible contamination.	TRUE	FALSE
2. I frequently get nasty thoughts and have difficulty in getting rid of them.	TRUE	FALSE
3. I am more concerned than most people about honesty.	TRUE	FALSE
4. I am often late because I can't seem to get through everything on time.	TRUE	FALSE
5. I don't worry unduly about contamination if I touch an animal.	TRUE	FALSE
6. I frequently have to check things (for example, gas or water taps, doors, and so on) several times.	TRUE	FALSE
7. I have a very strict conscience.	TRUE	FALSE
8. I find that almost every day I am upset by unpleasant thoughts that come into my mind against my will.	TRUE	FALSE
9. I do not worry unduly if I accidentally bump into somebody.	TRUE	FALSE
10. I usually have serious doubts about the simple everyday things I do.	TRUE	FALSE
11. Neither of my parents was very strict during my childhood.	TRUE	FALSE
12. I tend to get behind in my work because I repeat things over and over again.	TRUE	FALSE
13. I use only an average amount of soap.	TRUE	FALSE
14. Some numbers are extremely unlucky.	TRUE	FALSE
15. I do not check letters over and over again before mailing them.	TRUE	FALSE
16. I do not take a long time to dress in the morning.	TRUE	FALSE
17. I am not excessively concerned about cleanliness.	TRUE	FALSE
18. One of my major problems is that I pay too much attention to detail.	TRUE	FALSE
19. I can use well-kept toilets without any hesitation.	TRUE	FALSE
20. My major problem is repeated checking.	TRUE	FALSE
21. I am not unduly concerned about germs and diseases.	TRUE	FALSE
22. I do not tend to check things more than once.	TRUE	FALSE
23. I do not stick to a very strict routine when doing ordinary things.	TRUE	FALSE
24. My hands do not feel dirty after touching money.	TRUE	FALSE
25. I do not usually count when doing a routine task.	TRUE	FALSE
26. I take rather a long time to complete my washing in the morning.	TRUE	FALSE
27. I do not use a great deal of antiseptics.	TRUE	FALSE
28. I spend a lot of time every day checking things over and over again.	TRUE	FALSE
29. Hanging and folding my clothes at night does not take up a lot of time.	TRUE	FALSE
30. Even when I do something very carefully, I often feel that it is not quite right.	TRUE	FALSE

EXERCISE SELF-REPORTING SCALE

1. To your knowledge, is there any history of psychopathology (i.e. a psychological disorder) in yourself or your family?

   Yes ☐ No ☐

   If yes, name them (e.g. depression in my mother)

   _____

   _____

   _____

   _____

2. How long have you been exercising regularly (i.e. 3-5 times per week?

   _____

3. Briefly mention the main reason for starting up an exercise regime:

   _____

   _____

   _____

   _____

   _____

4. What type of exercise do you do at the gymnasium (i.e. aerobic exercise, running, walking, aerobics, steps, cycling etc., versus anaerobic exercise - weights or tone and stretch exercises)

   _____

   _____

   _____

5. What type of exercise do you do outside the gymnasium?

   _____

   _____

6. How many times per week do you exercise and how many hours do you exercise at a time?

_____

_____

_____

7. How do you feel about your exercise behaviour? (Please circle the appropriate statement.)

a) I exercise more than I would like to.

b) I exercise as much as I would like to.

c) I exercise less than I would like to.

8. What is your primary motivation to exercise?

a) I exercise for fitness purposes.

b) I exercise for weight control.

c) I exercise for social reasons.

9. Do you think there is too much emphasis on cultural values of fitness?

Never						Always
1	2	3	4	5	6	7

10. Do you think there is too much emphasis on cultural values of thinness?

Never						Always
1	2	3	4	5	6	7

11. Do you exercise primarily for:

a) Health promotion.

b) Physical appearance.

c) Both of the above.

12. Do you smoke cigarettes?

Yes ☐ No ☐

If yes, how many per day? _____

13. Do you have a positive body image, i.e. do you like the way you look?

Very Negative						Very Positive
1	2	3	4	5	6	7

If not, what specifically don't you like about your body?

_____

_____

14. Does exercise make you feel better about your body?

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

15. Do you feel guilty when unable to exercise?

Never guilty						Always guilty
1	2	3	4	5	6	7

16. Do you exercise in spite of injuries or illness?

Never						Always
1	2	3	4	5	6	7

17. What is your perceived health status?

a) Very good

b) Moderate

c) Poor

18. Do you use exercise as a stress coping mechanism, i.e. as a means to reduce stress?

Never						Always
1	2	3	4	5	6	7

19. Do you feel mentally preoccupied with exercise?

Never						Always
1	2	3	4	5	6	7

20. Do you feel mentally preoccupied with dieting?

Never						Always
1	2	3	4	5	6	7

21. Do you consider yourself to be an achievement-oriented, stress-seeking, competitive person (i.e. Type A)?

Never						Always
1	2	3	4	5	6	7

22. Do you consider yourself to be a perfectionist?

Never						Always
1	2	3	4	5	6	7

APPENDIX B: INTERVIEW SCHEDULE

All interviewees were thanked at the onset for agreeing to participate. It was explained that the interview will take about 30 minutes and that the purpose is to provide further insight into their diet - exercise routine. The confidential nature of the interview was stressed and if possible their permission to record the session was obtained.

1. Why do you exercise?

2. How do you view your role as an exerciser? Is it separated or integrated with the the other roles you assume? What is the significance of this role with respect to the other roles in your life?

3. What is your estimate of the importance of exercise in your life? How important is it to you?

4. What are your basic feelings while you exercise? What are your feelings when you finish exercising? What sort of feelings do you have when you don't or can't exercise?

5. What are the motivational considerations behind you exercising?

6. How would you define the concept of exercise dependence? Do you see yourself as exercise dependent? How long did it take you before you got the feeling of being an exercise addict?

7. Do you find your level of exercising affects your eating attitudes and behaviours?

8. Does your concern about weight and eating influence your exercise behaviour?

9. Which of the above two links would you say applies best to you?

FEEDBACK ON THE QUESTIONNAIRES WITH SPECIFIC EMPHASIS ON WHAT HAS CHANGED IN THE LAST ONE AND A HALF YEARS. COMMENTS WERE ELICITED FROM RESPONDENTS.