Examining the impact of exercise on body image dissatisfaction, mood and self-esteem in overweight women

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ABSTRACT

The main aim of this study was to examine the efficacy of exercise in the treatment of body image and mood disturbance in overweight women. The impact of exercise on self-esteem, physical self-efficacy and efficacy for weight control was also investigated. A second aim of the study was to explore factors which may contribute to the development of body image dissatisfaction in those who are overweight or obese, including an examination of the association between habitual levels of exercise and body image in the baseline data.

Overweight and obese women were recruited to the study through newspaper advertisements. Three hundred and fifty questionnaires were sent to interested respondents, of which 66% were returned completed. Fifty six subjects who were eligible to participate in the experimental phase of the study, completed baseline assessments and were assigned either to the exercise (n=28) or waiting-list control (n=28) group. During the second phase of the study, subjects in the waiting-list control group were crossed over to the exercise condition and re-assessed at completion.

In the exercise condition, women were instructed on a brisk walking program, requiring them to walk for up to 30 minutes on 5 days a week, over a period of 8 weeks. Program completers and waiting-list controls were compared on both physical (fitness and body measurements) and psychological variables (body image satisfaction, mood, self-esteem, physical self-efficacy, efficacy for weight control) during the experimental phase of the study. Data from the waiting-list controls,
when they were crossed over to the exercise condition, were compared with data from the first exercise group. Participants were followed up 2 months after completing the exercise phase.

Attrition was high in the exercise phase (35%-46%). Results for completers indicated significantly greater improvements in fitness, mood, physical self-efficacy and efficacy for weight control for those in the experimental group relative to the waiting-list controls. These findings were observed without any significant changes in weight and were replicated when the waiting-list control group were assigned to the exercise condition.

There was an improvement on most measures of body image over time, in both groups, suggesting that aspects of the procedure other than exercise were responsible for the effect.

The high rates of attrition limit the generalisability of the findings, which are discussed in the wider context of the development of body image dissatisfaction in those who are overweight or obese.
CHAPTER 1

INTRODUCTION

Body image problems form an integral aspect of the presenting symptomology of obesity (Thompson, 1996). Although it is assumed that obese individuals experience greater body image dissatisfaction than those of average weight, much of the body image research has focussed on the body image disturbances of eating disordered samples. An increasing number of researchers, however, have started to respond to the need to investigate people outside the range of 'normative discontent' (Imm & Pruitt, 1991) to increase understanding of the development and treatment of body image disturbances amongst the obese.

A number of prolific researchers have long been recommending that body image strategies be included as a component of weight control programs, after the observations that weight loss alone does not always correspond with improvements in body image (Brownell & Rodin, 1994; Brownell & Wadden, 1991; Cash, Counts & Huffine, 1990; Garner & Wooley, 1991). The question of how dysfunctional body image distortions can be therapeutically altered has recently seen the development of a variety of 'non-dieting' approaches to obesity treatment, including the use of cognitive behavioural techniques. Of interest to this study, is a comparison between cognitive behavioural treatment and an exercise intervention which showed roughly equivalent improvements in body image satisfaction in a sample of average weight individuals (Fisher & Thomson, 1994). It is the efficacy...
of exercise in the treatment of body image dissatisfaction in overweight women that is the focus of the current research. Despite its intuitive appeal, physical activity as an intervention for body image disturbance has received minimal attention (Thompson, 1996; Loland, 1998).

An introduction into the epidemiology of obesity and the uptake of physical activity will be presented before the literature on body image research is described. After defining body image and its measurement, research on the prevalence of body image dissatisfaction in obese samples, models proposed for its development and the relationships between body image disturbance, mood and self-esteem will be discussed. In describing the interventions for the treatment of body image dissatisfaction, I will include a summary of non-dieting approaches before presenting the literature on exercise and body image dissatisfaction. The impact of exercise on other aspects of psychological health will also be discussed. The final section will focus largely on walking programs, the intervention used in this study.

1. EPIDEMIOLOGY OF OBESITY

1.1 Definition and prevalence of overweight and obesity

The World Health Organisation (WHO, 1998) recommend the classification of overweight and obesity according to the body mass index (BMI). BMI is calculated by dividing an individual’s weight (kg) by the square of their height (m). While a BMI of between 18.5 and 24.9 is considered to be in the healthy range, a BMI of 25 and above is indicative of overweight with a BMI greater than 30 being classified as obese.
The WHO (1998) reported that the world-wide prevalence of obesity has been increasing at an "alarming" rate. In England, the prevalence of obesity has more than doubled in the past ten years (Prescott-Clarke & Primatesta, 1997). The most recent figures estimate that in 1994, 29% of women aged 16-64 years were overweight and approximately 16.5% were obese. The prevalence of obesity increases with age, particularly in women (Williamson, Kahn, Remington & Anda, 1990) and also for women, is strongly linked with lower socio-economic status (Goldblatt, Moore & Stunkard, 1965).

1.2 Health risks associated with overweight and obesity

There has been some disagreement amongst health professionals as to the health risks associated with obesity. An early study by Mann (1974) had reported little indication of a correlation between obesity, high blood pressure, heart disease and cholesterol levels. More recent literature, however, has indicated several serious health risks associated with being overweight including non-insulin dependent diabetes mellitus (NIDDM), cardiovascular disease, certain types of cancer (mainly hormonally related and large-bowel cancers) and gallbladder disease (WHO, 1998). A study by Manson, Willet and Stampfer (1995) reported that severe obesity (BMI ≥35) is associated with a twelve-fold increase in the risk of mortality in 25-35 year olds compared to lean individuals.

Researchers have recently suggested that it is the distribution of fat, in particular excess abdominal fat, that is a more important indicator of the health risks associated with obesity rather than excess fat per se. Although the research in this area is still relatively new, James (1996) considers that women with a waist to hip ratio (WHR)
of greater than 0.85 are exposed to the greatest health risks. Waist circumference alone has also been proposed as a valid index of both intra-abdominal fat mass (e.g. Han, 1995) and total body mass (Lean, Han & Deurenberg, 1996) although the health risks associated with particular waist circumferences are still under investigation. Obese individuals are at higher risk of developing hypertension (one of the risk factors for cardiovascular disease) than are lean individuals (Stamler, Neaton & Wentworth, 1989); both systolic and diastolic blood pressure have been shown to increase with BMI (e.g. Stamler et al., 1989). The risk of developing hypertension also increases with the duration of obesity, particularly in women (MacMahon, 1990).

1.3 The physiological and health benefits associated with exercise

Investigations of the effects of physical activity\(^1\) on the course of obesity have largely focussed on its presumed physiological benefits in both the initial and long-term maintenance of weight loss (e.g. Perri et al., 1986). Exercise is consistently associated with the long term maintenance of weight loss (e.g. Epstein et al., 1982) although without sufficient dietary restriction, exercise alone is not enough to produce significant weight loss in the obese. Packer (1989) noted that many overweight people do not realise the importance of exercise for maintaining health rather than impacting weight loss, and only exercise when dieting.

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\(^{1}\) Physical activity refers to “any bodily movement produced by skeletal muscle that results in a substantial increase over resting energy expenditure” and includes occupational work (activities undertaken during the course of work, household and other chores as part of day to day living) and leisure time physical activity (undertaken in the individual’s free time, including exercise and sport). Exercise is defined as a planned and structured subset of physical activity usually undertaken for the purpose of improving or maintaining physical fitness (WHO, 1998).
Physical activity has numerous physiological benefits regardless of BMI and age. Exercise is associated with falls in blood pressure (WHO, 1998) and individuals who engage in moderate or vigorous exercise at least weekly are less likely to have NIDDM (Helmrich et al., 1991), coronary heart disease (Dubbert, 1992) and cancer (Blair et al., 1989), as well as having lower mortality rates than those who are the least active (WHO, 1998). These improvements in health, with increases in physical activity, can occur with only minimal weight loss (Powell et al., 1989, Wood et al., 1988). Krotkiewski et al. (1979), for example, found that six months of physical training in a group of obese women lead to reductions in blood pressure without any changes reported in either body weight or body fat.

A number of studies have supported the premise that modest levels of physical activity may be sufficient for improvements in health in the absence of weight change (Blair et al., 1989; DeBusk et al., 1990; Duncan et al., 1991; Helmrich et al., 1991; Rippe et al., 1988). Blair et al (1989) found that the greatest mortality risk is between those who are least fit and those who are only modestly fit, with little difference occurring at the higher end of the spectrum i.e. between those who are modestly and those who are highly fit.

1.4 **Levels of exercise participation**

Only about 20% of individuals in the general population engage in physical activity at a frequency, intensity and duration sufficient to establish its beneficial effects (Dubbert, 1992). Obese individuals, in particular, often report low levels of physical activity (Brownell & Stunkard, 1980), which may, in part, be due to lower socioeconomic status and financial resources (Packer, 1989). The widespread belief that
fatness is equated with poor health, may also deter overweight individuals from engaging in exercise, if they felt they were at risk of illness or a heart attack.

Although cross sectional data have revealed an inverse relationship between BMI and physical activity levels (Schulz & Schoeller, 1994; Westerterp & Goran, 1997), it is not possible to establish causality from such correlational data. Are overweight individuals less active because of their excess weight or do low levels of activity contribute towards obesity? A global reduction in levels of physical activity has paralleled the rising incidence of overweight and obesity (WHO, 1998), and improving physical activity levels has been identified as one of the targets identified by the World Health Organisation.

Garner & Wooley (1991) suggest that the experience of being overweight may deter many obese individuals from activity out of shame and fear of ridicule. The experiences of exercise for overweight individuals may have been negative ones, such as being teased or selected last for teams. In adulthood, overweight individuals may feel inexperienced in sports and exercise, embarrassed by a lack of coordination, fear being ridiculed by others or concerned about their appearance in exercise clothing (Brownell, 1995). Being 'fat' and unfit is viewed as socially unacceptable and may lead to a decreased evaluation and satisfaction with one's body (Fallon, 1990; Tucker, 1987). As will be discussed in detail later, researchers such as Sonstroem (1982); Sonstroem and Morgan (1989) have claimed that involvement in activity may relate to an improved sense of physical competence, which Loland (1998) amongst others, has speculated may improve the evaluation and degree of satisfaction with one's body.
1.5 Obesity and psychosocial disturbances

“*Obesity* does not create a psychological burden. Obesity is a physical state. *People* create the psychological burden” Stunkard and Sobal (1995), p.417

While psychoanalytic theorists conceptualised obesity as the manifestation of underlying psychopathology (e.g. Kaplan & Kaplan, 1957), others have suggested that any association between obesity and psychopathology reflects an emotional reaction to one’s physical condition and social treatment (Faith & Allison, 1996).

Being overweight, at least in Western society, continues to be highly stigmatised. A frequently cited study is that of Staffieri (1967) who found that children as young as six years old described pictures of obese children using the adjectives “lazy, dirty, stupid, ugly, cheats and lies” more often than drawings of other body shapes. The social stigma attached to obesity is well ensconced, cutting across age, sex and socio-economic status (Allon, 1975, 1979; Wadden & Stunkard, 1987). Studies have reported that, compared to ‘normal’ weight persons, obese individuals receive fewer job offers (Klesges, et al., 1990), lower salaries (Frieze et al., 1990) and are less likely to marry (Gortmaker et al., 1993).

The stigma associated with obesity is culturally bound. Although black women in the USA are two to three times more likely to be obese than white women, they have been shown to experience less social pressure about their weight and less likely to be dieting at each developmental milestone (Striegel-Moore, 1996).

The active discrimination against overweight individuals in Western Society may, in part, contribute to the host of psychosocial problems that often have been assumed to
be associated with obesity (Tanco, Linden & Earle, 1998). However, the relationship between psychopathology and obesity is frequently being questioned and the prevalence of psychological disturbance is not reported to be any greater in obese than in non-obese individuals (Stunkard & Wadden, 1992).

Studies have generally shown few differences in levels of depression or self-esteem between obese and non-obese individuals (e.g. Sarwer, Wadden & Foster, 1998; Wadden, Brown, Foster & Linowitz, 1991). For example, in a recent study, Sarwer et al. (1998) reported similar 'non-clinical' scores on both the Beck Depression Inventory (BDI, Beck et al., 1961) and the Rosenberg Self-Esteem Inventory (RSE; Rosenberg, 1965) in a sample of 79 treatment seeking obese women (BMI=36) and 43 non-obese controls (BMI=24). However, one aspect that has been shown consistently to characterise the obese, in comparison to average weight individuals, is the degree of body image disparagement (Stunkard & Wadden, 1992).

Overall, epidemiological and clinical studies have shown that obese individuals do not differ from the non-obese in psychopathology or psychological symptoms (Rosen, Orosan & Reiter, 1995) refuting the popular notion that overweight persons as a group are emotionally disturbed (Wadden & Stunkard, 1987). Grilo, Wilfley, Jones, Brownell and Rodin (1994) suggest that rather than comparing obese and average weight persons, the variability of body image dissatisfaction, self-esteem and mood within the obese population needs to be understood.
2. BODY IMAGE DISSATISFACTION AND OBESITY

2.1 Defining body image

There have been a number of conceptualisations of the term body image over the course of the century. The original concept developed from the gestalt theorists who were concerned with such phenomenon as the 'phantom limb' syndrome (Kohler, 1947; Schilder, 1935) and who proposed the idea of a mental representation of body information. More recently, the term 'body image' has come to be considered as a multidimensional construct (e.g. Keeton, Cash & Brown, 1990) comprising perceptual, affective, cognitive and behavioural aspects.

Garner and Garfinkel (1981) described two basic ways in which body image disturbance may manifest itself: body size distortion (a perceptual disturbance in the accuracy with which body parts are perceived) and body dissatisfaction (the attitudinal or affective dimension; including thoughts and feelings about the body). Rosen (1990) further elaborated on the subjective component of body dissatisfaction claiming that, in addition to the cognitive and affective aspects (i.e. the thoughts and feelings one holds about one's body), it is important to consider the behavioural aspect of body image disturbances (usually the avoidance of certain situations because of concerns about weight and/or shape). While little overlap between the perceptual and subjective/attitudinal aspects of body image disturbance are thought to exist (Cash & Green, 1986; Keeton et al., 1990; Thompson, Penner & Altabe, 1990) the affective, cognitive and behavioural aspects of the subjective component of body image are to a large degree related (Stormer & Thompson, 1996). For the purposes of this study, body image dissatisfaction will refer to the cognitive, affective and behavioural aspects of body image which form the subjective attitude that an individual has regarding her body.
Body image dissatisfaction is so prevalent amongst women of all age ranges that it has been termed “normative discontent” (Rodin, Silberstein & Striegel-Moore, 1985). Rosen (1996a) argues that because reports of body image dissatisfaction are so widespread, some accepted definition of significant distress is needed.

In their seminal paper “disturbances in body images in some obese persons”, Stunkard and Mendelson (1961) describe the body image disturbance occurring in some obese individuals as taking the form of “an overwhelming preoccupation with one’s obesity, often to the exclusion of any other personal characteristic. It may make no difference whether the person be also talented, wealthy, or intelligent; [his] weight is his only concern, and he sees the whole world in terms of body weight” (p.328). This description of body image disturbance is similar to that of Body Dysmorphic Disorder, the only accepted term for body image disorder (Rosen, 1996a). However, Body Dysmorphic Disorder is defined as a pre-occupation with an imagined or slight defect in appearance, which causes clinically significant distress or impairment in social, occupational or other important area of functioning (American Psychiatric Association, 1994) and as such cannot be applied to those who overweight or obese since the ‘defect’ is real and not imagined.

Thompson (1992) has suggested a diagnostic category of ‘body image disturbance’ to include those with an appearance–related disturbance (including obesity) if at least two of the following criteria are met: 1) presence of daily affective distress; 2) cognitive distortions; 3) behavioural avoidance, and 4) perceptual overestimation of size. Rosen (1996a) prefers the use of the term ‘negative body image’ to refer to the condition that is “more distressing and inhibiting than ordinary body dissatisfaction”.
2.2 Measurement of body image

In line with the multidimensional nature of body image a plethora of measurements have been developed to assess its many different facets. Many of these have been developed for use with eating disordered samples and may therefore be inappropriate for use with overweight samples. Thompson (1993) has prepared a useful summary of the available measures, together with the standardisation information and data on validity and reliability. In his review, Thompson recommends the use of a variety of measures pertaining to the affective, cognitive, behavioural and perceptual components of body dissatisfaction. Keeton et al. (1990) too recommend that researchers of body image should “select multiple indices rather than assume either the equivalence of instruments or the uniformity of body image as a hypothetical construct” (p.228).

Measures tapping the attitudinal aspect of body image have been suggested to be more clinically relevant than perceptual measures since they have high construct validity and moderate associations with psychological adjustment (Cash & Brown, 1987; Keeton et al., 1990).

Thompson (1992) has questioned the validity of perceptual size estimation procedures which have shown a tendency for both obese and non-eating disordered 'normal' weight women to overestimate body dimensions (Birtchnell, Dolan & Lacey, 1987; Collins, McCabe, Jupp & Sutton, 1983; Garner, Garfinkel & Moldofsky, 1978; Garner, Garfinkel, Stancer & Moldofsky, 1976; Gluckman & Hirsch, 1969; Pearlson, Flourney, Simonson & Slavney, 1981). Thompson (1986) suggests that perceptual size distortion may be the result of individual, non-specific perceptual differences and unrelated to differences in “body-image percepts per se”.

11
Thompson discusses a number of contextual and dispositional factors that affect size estimation, not least a practice effect. Keeton et al. (1990) have also questioned the convergent and discriminant validity of measures assessing the accuracy or distortion of body-size estimation. To enable understanding of what the existing perceptual distortion tasks actually measure, Keeton and his colleagues recommend researchers to include general perception tasks (e.g. visuo-spatial tasks) to control for the possibility of more general perceptual difficulties for the individual.

To assess the severity of body image disturbance or 'negative body image', Rosen (1996a) recommends the use of the Body Dysmorphic Disorder Examination (BDDE; Rosen & Reiter, 1994) excluding the criterion referring to the 'normality' of appearance. A self-report version of this measure has also been developed. The features of 'negative body image' include a distressing preoccupation with appearance, self-consciousness and embarrassment in social situations, distress when appearance is noticed by others, excessive importance given to appearance in self-evaluation, negative self-evaluation attributed to appearance and avoidance of activities because of self-consciousness about appearance (Rosen, 1996a).

2.3 Research on body-image dissatisfaction: A caveat

Generally, researchers have discussed different aspects of body image in their research which taken together with the wide variety of measurement instruments used to assess body image satisfaction and disturbance has resulted in rather contradictory findings in the literature (Klesges, 1983). A number of reviews have consequently concluded that there has been a lack of consistent, empirical or theoretical line of inquiry for clarifying the body image construct (Keeton, Cash &
Brown, 1990). The different definitions and assessments grouped under the rough rubric of 'body image', need to be borne in mind when comparing studies on body image dissatisfaction.

### 2.4 Body dissatisfaction in obesity

In a large scale survey Cash, Winstead and Janda (1986) found that 79% of overweight women had a negative body image as assessed by the Appearance Evaluation sub-scale of the Multidimensional Body Self-Relations Questionnaire (MBSRQ; Brown, Cash & Mikulka, 1990). Compared to average weight individuals, obese persons are generally thought to overestimate or distort their body size more, be more dissatisfied and preoccupied with their physical appearance and avoid more social situations due to their appearance (e.g. Cash, 1990; Tiggeman & Rothblaum, 1988).

Using the self-report version of the Body Dysmorphic Disorder Examination, Sarwer, Wadden and Foster (1998) found greater body dissatisfaction in obese women enrolled in a program to examine the effects of dieting, compared to non-obese controls. The majority of obese subjects (68%) reported moderate to extreme dissatisfaction with their general appearance, compared to a third of the non-obese control group. Over one third (36%) of the obese women in this study reported thinking about their appearance and being upset on more than half of the days of the month and the same percentage (36%) reported moderate to extreme embarrassment in social settings such as work and parties. These percentages were significantly greater than those observed in the control group (14% and 16% respectively). A significantly higher percentage of the obese women also felt that their appearance
was abnormal (58%) compared to non-obese women (24%). Using the BDDE in a sample of 51 overweight women (mean BMI=34) who had presented for body image treatment, Rosen, Orosan and Reiter (1995) found that 82% were more than one standard deviation above the norms for adult community women.

However, the high levels of body image dissatisfaction in those seeking treatment for obesity (as in the two studies above) may not be typical of the overweight population. Many obese individuals report no disturbances in either the perceptual or attitudinal aspects of body image (Stunkard, 1975). In one study of female volunteers for example, no differences were found between those who were obese and those of normal weight (Faubel, 1987).

The amount of association between actual body weight and body dissatisfaction has been of great interest to researchers. However, correlations have varied considerably, depending on the measure used. In samples of college women, a correlation of 0.18 has been found between BMI and body dissatisfaction using the Body Dissatisfaction Scale of the Eating Disorder Inventory (Bailey et al., 1990), 0.34 using a modified Body Cathexis Scale (Davis et al., 1993) and 0.43 for the Body Shape Questionnaire (Strauman et al., 1991). In the study of obese and average weight women cited earlier (Sarwer et al., 1998), despite significantly greater body dissatisfaction being reported by obese than non-obese women, BMI did not correlate with dissatisfaction scores. Davis, Durnin, Gurevich, LeMaire and Dionne (1994) have concluded that the shared variance between body dissatisfaction and weight or fatness does not extend beyond 30%.
These generally low correlations indicate that factors other than objective overweight contribute to body image dissatisfaction. One of the factors identified as contributing to the degree of body image dissatisfaction is the age of onset of obesity. Those whose obesity developed in childhood have consistently been shown to have greater body image dissatisfaction than those who became obese as adults (Grilo, Wilfley, Brownell & Rodin, 1994; Stunkard & Burt, 1967; Stunkard & Mendelson, 1961). For example, Adami, Gandolfo, Campostano, Meneghelli, Ravera & Scopinaro (1998) compared the body image disparagement of 110 obese subjects with 131 formerly obese subjects who were at normal weight following biliopancreatic surgery and a group of ‘never obese’ controls. They found that in the post-operative group, women with adult-onset obesity were similar in body image satisfaction to the control group, whilst body image disparagement in those with childhood onset remained similar to that of the currently obese group of women. Post surgery, subjects with early-onset obesity had remained dissatisfied with their bodies even though they had maintained a normal body weight and shape. These results suggest that body image dissatisfaction in those with child-onset obesity may reflect inner thoughts and feelings that are independent of body weight. The role of the age of onset of obesity in the development of body image dissatisfaction will be discussed in more detail in the following section.

2.5 Models proposed for the development of body image disturbance

By far the majority of studies on body image have focussed on the body image disturbances of adolescent females, more often than not with eating disorders (Loland, 1998). Four main models have been hypothesised to explain the development and or maintenance of body dissatisfaction in average and underweight
samples (Thompson, 1992): negative verbal commentary, socio-cultural models, social comparison and maturational status.

The negative verbal commentary model is supported by research that has indicated that teasing about appearance and/or weight during childhood is associated with increased body dissatisfaction, eating disturbances and general psychological functioning (e.g. Brown, Cash & Lewis, 1989; Cattarin & Thompson, 1994; Fabian & Thompson, 1989). This model has received some attention in the literature on obesity, largely in an attempt to explain the consistent finding that childhood-onset obesity is associated with greater body image dissatisfaction than adult-onset obesity.

Becoming obese during childhood or adolescence, however, is not sufficient alone for the development of body image disturbance (Stunkard & Mendelson, 1961) and Rosen (1995) proposes that the risk of developing a body image disturbance is greater if child-onset obesity is coupled with negative feedback such as being teased. Such negative attention during this stage of development, when the body construct develops (Offman & Bradley, 1992), may put the individual at higher risk of developing body image problems. Rosen suggests that teasing experiences may trigger dysfunctional assumptions about the normality of one's physical appearance and its importance to personality, self-worth and acceptance.

Support for the negative verbal commentary model of the development of body image dissatisfaction comes from Grilo, Wilfley, Brownell and Rodin (1994), who found that the frequency of being teased about weight and shape during childhood in
women with child-onset obesity (defined as onset before 18 years) was significantly correlated with body dissatisfaction and (negatively) correlated with self-esteem. Since this was a correlational study, the usual rules of being unable to imply causality apply and the authors' highlighted the possibility that current body dissatisfaction may have resulted in biased recall of salient childhood experiences. A further limitation with this study, is that participants were only asked to report teasing during childhood, and not more recent teasing experiences, which may also account for variations in body image dissatisfaction.

In support of the negative verbal commentary model, there has been one longitudinal study which found that teasing predicted the development of body dissatisfaction in adolescent girls, over a three year period (Cattarin & Thompson, 1994). Although it does appear that being teased about one's weight during childhood is a potential risk factor for the development of body dissatisfaction, further exploration of this model for the development of body image dissatisfaction in those who are overweight or obese is required.

Socio-cultural models describe the impact on body image dissatisfaction of media messages supporting the 'thin ideal' and have received the most widespread support, underpinning much of the research into the development of eating disorders. The model proposes that social pressure is the impetus behind an individual's need to conform to body shape standards (Fallon, 1990; Stormer & Thompson, 1996). Studies that have attempted to investigate directly the impact of societal and the media's portrayal of the 'body ideal', have reported that females exposed to appearance related commercials report less satisfaction with their body shape than
those exposed to non appearance related images (e.g. Heinberg & Thompson, 1995). This study and another by Stice et al. (1994) also reported that higher levels of internalisation of societal values of appearance predicted body dissatisfaction. However not all women, either of normal weight or over, experience body image disturbances as the socio-cultural model would predict and on it’s own it does not provide an adequate explanation of how some women come to develop body image disturbances while others do not.

Social comparison theory, an outgrowth of the socio-cultural model of body image dissatisfaction, considers individual differences to be important in accounting for levels of dissatisfaction within a culture that endorses the ‘thin ideal’. The model is based on the theory that humans have an innate tendency to derive information about the self through a process of social comparison (Festinger, 1954). In particular, ‘upward’ comparison to those ‘more attractive’ has been associated with a greater risk of body dissatisfaction (Heinberg & Thompson, 1992a, 1992b). In their second study (Heinberg & Thompson, 1992b), the authors found that comparing oneself to specific individuals (e.g. friends) was associated with greater body image anxiety and distress than comparing themselves to generic others (e.g. an ‘average’ person) irrespective of whether this was an upward or downward comparison. In evaluating social comparison theory and teasing history, Thompson and Heinberg (1993) found that comparing oneself to an unrealistic ideal accounted for less of the variance in body image dissatisfaction than teasing about weight and size in a sample of 146 female college students. Unfortunately, the weight of participants was not discussed, and the generalisability of these results to those who are objectively overweight is therefore limited.
The fourth model, the maturational status model suggests that early physical development is a central factor in the development of body dissatisfaction (Thompson, 1990). Early menarche (typically defined as 11 years or earlier) has been associated with a more negative body image than that observed for girls who mature later than their peers (Thompson, 1990). Although later maturational development has been reported to result in less body fat and weight (Thompson, 1992), what may be more important is the greater risk of being teased about early physical development in those who reach menarche earlier than their peers (Fabian & Thompson, 1989).

Stormer and Thompson (1996) compared the usefulness of these four models in predicting body image and eating disturbance in 162 college students, the majority of whom were women. Controlling for level of obesity and overall self-esteem, Stormer and Thompson reported that social comparison and the internalisation of socially endorsed standards were significant predictors of body image and eating disturbance. Maturational status did not contribute any unique variance and a history of being teased did not explain as much of the variance as that previously reported by Thompson and Heinberg (1993). In an attempt to explain this finding, Stormer and Thompson (1996) suggested that teasing during childhood may lead to the onset of excessive social comparison and/or the internalisation of cultural standards of acceptable appearance. In hindsight, they questioned whether the comparison of current levels of body comparison and cultural attitudes with historical influences such as teasing were valid. It should be noted that although these findings were evident after controlling for weight, the authors did not present
the level of obesity in their sample and it is therefore still uncertain as to how applicable these findings are to those who are objectively overweight.

2.6 Body image dissatisfaction, self-esteem and mood

Early research had suggested that obese individuals who harbour a distorted body image all “suffer some type of emotional disturbance” (Stunkard & Burt, 1967). However, the relationship between body image dissatisfaction and the global constructs of psychopathology in obesity remain unclear.

Body image dissatisfaction and self-esteem

Body image may be an important aspect of self-esteem particularly in cultures which emphasise slender and thinness as the ‘body ideal’ (e.g. Silberstein, Striegel-Moore, Timko & Rodin, 1988; Striegel-Moore, Silberstein & Rodin, 1986, 1993). This premise is supported by a number of studies indicating that self-esteem and body image dissatisfaction covary. For example, high levels of body image dissatisfaction were associated with low self esteem in a sample of 60 obese women (mean BMI=36), enrolled to a weight loss program (Foster, Wadden & Vogt, 1997). A significant correlation between body image dissatisfaction and self-esteem was also reported by Sarwer et al. (1998). However, Grilo, Wilfley, Brownell and Rodin (1994) reported that body image dissatisfaction and self-esteem were not significantly correlated in those with early-onset obesity. This may have been due to the small sample size (n=15).

A number of other studies have failed to find a relationship between self-esteem and body dissatisfaction in large samples of college aged women (Mahoney, 1974;
Mahoney & Finch, 1976; Silberstein et al., 1988). While the inconsistent results may once again reflect the different aspects of body image together with varying measurement instruments, Silberstein et al. (1988) suggest that the failure to find a relationship between body image dissatisfaction and self-esteem, may be because weight dissatisfaction is so ‘normal’ it does not influence self-esteem in some women. They suggest that “the woman who experiences herself as dissatisfied with her weight resembles rather than deviates from her peers” (p.230). One might speculate that dissatisfaction with body image is only likely to impact on self-esteem for those individuals who view appearance as an important aspect of self-evaluation. If self-esteem is derived from other, non-physical aspects, physical appearance may have little impact on an individual’s view of self. The differentiation between those who view physical appearance as an important aspect of self and those who do not and the consequent relationship between body image dissatisfaction and self-esteem will be examined in the current study.

**Body image dissatisfaction and mood**

A number of correlational studies have reported an association between body dissatisfaction and mood disturbance. For example, in a non-eating disordered sample of male and female college students, Biby (1998) found that lower body esteem was linked with higher depression. This correlation has also held true for clinical samples of obese women. Foster, Wadden and Vogt (1997) found that increased body dissatisfaction in obese women who enrolled in a weight loss program was associated with increased self-reports of depressive symptomology as well as lower self-esteem. In their study comparing obese treatment seeking women with non-obese controls, Sarwer, Wadden and Foster (1998) found that although
there were no group differences in the level of depressive symptomology reported, there was a significant correlation between body image disturbance and depression (using the Beck Depression Inventory, Beck et al., 1961) with those reporting greater body image disturbance being more depressed. Thus it appears that body image dissatisfaction rather than obesity, is associated with disturbances in mood.

The following quotation from Stunkard and Mendelson (1961) highlights one possible direction of the relationship between body dissatisfaction and mood: “When things are going well and a body image patient is in good spirits, he may be troubled little or not at all by such matters [i.e. his or her body image disturbance]. Let things go badly, however, let a depressive mood ensue, and all at once all the derogatory and unpleasant things in the person's life become focused upon his obesity, and his body becomes the explanation and the symbol of all his unhappiness” Stunkard and Mendelson (1961), p. 330.

Although this view sees mood as determining the intensity of the body image disturbance, in reality it is difficult to assess the direction of the association between mood and body image dissatisfaction. A study by Baker, Williamson and Sylve (1995) found that the induction of a negative mood state in a sample of average weight women lead to increased body size estimation and an increase in negative feelings about their body size/shape, providing some evidence for the influence of mood on body image dissatisfaction. However, the mechanism linking body image dissatisfaction and mood in obese samples has yet to be determined.
2.7 Body image dissatisfaction and obesity- A summary

In summary, the research on body dissatisfaction in obesity has shown that although body-image dissatisfaction is greater in obese than in non-obese individuals, it is not universal amongst the obese. A number of risk factors have been proposed for its development in obese individuals including childhood onset obesity and a greater frequency of being teased. While body image dissatisfaction is generally associated with increased dysphoria and often with low self-esteem, obesity per se is not. The relatively weak relationship between BMI and body dissatisfaction and the lack of corresponding improvements in body image satisfaction with weight loss poses the question of how dysfunctional body image distortions can be therapeutically altered (Cash & Hicks, 1990). This will be the focus of the next section.

3. TREATING BODY IMAGE DISTURBANCES

3.1 A new wave of obesity treatment studies

An ‘alternative paradigm’ to obesity research and treatment has been developed (Robison, 1997) which, rather than focussing on weight loss, emphasises self-acceptance, improved body image, better nutrition and increased rates of physical activity (Garner & Wooley, 1991; Robison, 1997; Wooley & Wooley, 1984). A number of these new paradigm treatments have included cognitive behavioural treatment (CBT) approaches. Typical cognitive–behavioural interventions described in the literature include educational approaches to challenge the negative stereotypes regarding obesity, the identification and modification of negative thoughts and beliefs about physical appearance and exposure to body image situations. The results of such ‘undieting’ approaches have generally been positive, resulting in significant
improvements in body image satisfaction in the absence of weight loss (Roughan, Seddon & Vernon-Roberts, 1990; Rosen, Orosan & Reiter, 1995).

There have been a number of controlled studies which have shown the effectiveness of CBT in the improvement of body image satisfaction for women of average weight (Butters & Cash, 1987; Dworkin & Kerr, 1987; Rosen, Cado, Silberg, Srebnik & Wendt, 1990; Rosen, Saltzburg & Srebnik, 1989). In the first study concerned with the effectiveness of CBT approaches to body image for overweight women, Rosen, Orosan and Reiter (1995) found that CBT lead to improved body image satisfaction, self-esteem and improved eating attitudes, all of which occurred independently of weight change.

Foster, Wadden and Vogt (1997) evaluated a 48 week CBT plus diet treatment alone or with exercise in a sample of obese women. They found improvements in weight loss, body image, self-esteem and mood for all groups with no reported additional effects of exercise. Due to the number of different components combined in the treatment packages, the authors were unable to ascertain whether changes in body image were related to participation in CBT, weight loss or some combination. Weight loss was associated with improvements in body image, although the degree of improvement was not related to the magnitude of the weight loss. At the end of treatment there were similar improvements in body image between those who had lost 9kg and those who had lost 25kg. This study will be explored in further detail in the following section.

In a recent controlled trial, Tanco et al. (1998) evaluated a “broad based” non-dieting cognitive therapy program to promote regular exercise, non chaotic eating and
psychological well-being in 60 obese female subjects. Improvements in depression, 
anxiety, self-control and eating related psychopathology were observed after an 8-
week program, relative to a behavioural weight loss program and a non-treatment 
control. Improvements were maintained over a 6 month follow-up.

These studies suggest that improvements in body image may occur independently of 
weight loss and further dispel the belief that weight itself solely accounts for the 
increased body dissatisfaction in obese individuals (Foster, Wadden & Vogt, 1997).

An interesting artefact of most of the studies that have used CBT in the treatment of 
body image disturbance has been the improvements observed in self-reports of 
eating habits. In samples of average weight women, post-intervention, subjects have 
reported less rigid eating habits, being less restrained and more in control of eating 
despite eating patterns not being actively being targeted in the therapy (e.g. Rosen et 
al., 1990). This finding was replicated in Rosen, Orosan and Reiter’s (1995) study 
of obese women, where despite that fact that the modification of eating patterns were 
not addressed in therapy, CBT subjects reported more feelings of being in control of 
eating and less guilt and preoccupation associated with eating at the end of treatment. 
Why eating behaviours improved is somewhat open to speculation. It may be that 
 improvements in body image satisfaction are associated with improvements in eating 
attitudes and habits, or vice versa. The improvements in mood which have been 
oberved following CBT treatment for body image dissatisfaction, when assessed, 
may also influence eating habits, as it is often following a negative mood state, that 
individuals tend to overeat (Davis, Freeman & Garner, 1988; Johnson & Larson, 
1982).
4. THE ROLE OF EXERCISE

4.1 Exercise and body image satisfaction

"Moving the body with and against gravity, with and against centrifugal impulses, may have an enormous influence on the body image"

Schilder (1950), p.207

Researchers studying the mental health benefits of exercise have generally confirmed the hypothesis that physical fitness training improves self-concept (Folkins & Sime, 1981; Hughes, 1984). Self-concept is defined as attitudes and evaluations of aspects of the self including body traits and abilities. Body image is but one aspect of self-concept, highly correlated with and expected to ‘radiate’ self-concept (Zion, 1965).

The literature on the effects of exercise on body image dissatisfaction however is less consistent. While some studies have reported that physical exercise is associated with greater body image satisfaction, others suggest that exercisers are more preoccupied and dissatisfied with their bodies than non-exercisers. A closer examination of individual studies suggests that the relationship between exercise and body image is complex, and appears to vary depending on the characteristics of the individual as well as the type of exercise undertaken.

A number of cross-sectional studies have reported that those who engage in at least ‘regular’ exercise have a more positive body image than non-exercisers (e.g. Adame, Johnson, Cole, Matthiasson & Abbas, 1990; Davis, Durnin, Dionne & Gurevich, 1994; Ho & Walker, 1982; Loland, 1998). In one of the earliest studies, Ho and Walker (1982) found that athletes in a variety of sports (tennis, swimming, basketball, track and field) reported more positive feelings towards their bodies than
non-athletes. Body satisfaction in this study was measured as a uni-dimensional construct using a rating scale of 1 (negative feelings about one’s body) through to 4 (positive feelings). Using an early version of the multidimensional body self-relations questionnaire, Adami et al. (1990) further supported the relationship between exercise and body image satisfaction. In a sample of 243 college men and women, they observed a more positive body image in those who were more physically fit. Using a modified version of the Body-Cathexis Scale (Secord & Jourard, 1953) to assess body image dissatisfaction, Davis et al. (1994) found physical activity was inversely related to body dissatisfaction for women aged 17-48 years.

In a recent, large scale survey of Norwegian men and women aged 18-67 years, Loland (1998) compared those who were inactive (no physical activity at all or physically active less than once a week), with those who were low- (physically active 1-2 times a week), moderate- (physically active 3-4 times a week) and high-active (physically active 5 or more times a week) on the Multidimensional Body Self-Relations Questionnaire. Of the 768 female respondents, all three active groups evaluated their physical appearance and fitness significantly better than the inactive group of women, with those in the high-active category evaluating their appearance more positively than the moderate and low active groups. On the Body Areas Satisfaction Scale of the MBSRQ, slightly modified by Loland, the moderate and high active women were the groups most satisfied with almost all areas of their bodies (e.g. stomach, waist, chest, total appearance).
Not all cross-sectional studies, however, have reported a positive relationship between exercise and body image satisfaction. Imm and Pruitt (1991), for example, found that high frequency exercising women (participating in a variety of aerobic activities, on average, for 9 hours per week) had a significantly more negative view of their body shape than moderate exercisers (exercising for approximately 4 hours per week) and non-exercisers. Although one interpretation of such results has been that exercise may serve to foster a narcissistic investment in the body (e.g. Katz, 1986), the very high frequency of exercise is unusual and may indicate that women more concerned with their appearance are more likely to exercise excessively.

The influence of personality characteristics in mediating the relationship between exercise and body image, is supported by a study from Davis (1990b). Following up a previous study which had shown female exercisers rating physical appearance as more important to their well-being than non-exercisers (Davis, 1990a), Davis (1990b) found that an addictive personality trait was related to body dissatisfaction and weight pre-occupation amongst exercisers. Thus the relationship between exercise and body image satisfaction may depend on the pre-existing personality characteristics of the individual.

The type of activity engaged in may also be important in explaining the association between body image and exercise. Those who participate in activities associated with a particular somatotype, such as dance and ballet, have been reported to be more likely to show body image disturbances (e.g. Garner, Garfinkel, Rocket & Olmstead, 1987; Hamilton, Brooks-Gunn, Warren & Hamilton, 1988). Similarly, many elite runners have been shown to be unhappy with their body size and shape, and
preoccupied with their weight (Brownell, Rodin & Wilmore, 1988). Perhaps, those who are more concerned about their appearance are more likely to seek out particular types of activity and/or exercise at high frequencies, rather than exercising fostering greater body image concerns.

Furnham, Titman and Sleeman (1994) explored the differing acceptability of a variety of body shapes in females who participated in a variety of sports (body building, rowing and netball) together with a sedentary control group. Here, exercisers (exercising on average, 5 times per week) rated themselves as being significantly more attractive, satisfied with their bodies, confident, healthy and popular than the controls. The body builders found muscular somatoforms more acceptable than members of the other sports, suggesting that engaging in this type of activity may create a greater tolerance for shapes that deviate from the societal norm. Although there is a need to be careful in interpreting causality, this finding may suggest that participation in physical activity may play a role in helping some women to broaden the range of culturally acceptable female shapes, freeing them to become more accepting of the biologically normal range of shapes and sizes (Furnham et al., 1994).

The inconsistencies in the findings of cross-sectional research exploring the relationship between body image dissatisfaction and exercise in average weight samples appears to depend on the personality characteristics of the individual as well the type and frequency of exercise studied. One of the major limitations of cross-sectional designs is the restriction in predicting causality. The findings from the
experimental literature, where exercise interventions have been applied, provide a greater insight into the relationship between body image satisfaction and exercise.

A number of quasi-experimental studies have shown few improvements in body image satisfaction for those already enrolled in exercise programmes. For example Ford, Puckett, Blessing and Tucker (1989) followed a sample of 108 female university students already enrolled in aerobics, jogging, weight training and swimming classes and a control group (a health science class) over 8 weeks of their chosen program. The authors were interested in the differences between the activity groups and control group on measures of fitness, self-esteem and body cathexis (positive and negative feelings individuals have towards their bodies). At the end of 8 weeks, there were no significant differences among the individual activity groups or the control group on either self-esteem or body cathexis after controlling for pre-test scores. The authors concluded that "most of the subjects improved in multiple areas from the pre-test to the post-test", although statistical analyses were not presented to support this claim. A similar study by Ward and McKeown (1988), of 41 college aged females already enrolled in a twice weekly aerobics class, found no significant improvements in body cathexis or body composition, over 10 weeks.

In an attempt to explore the differential effects of aerobic and strength training activities on body satisfaction, physical self-perceptions, self-esteem, and fitness, Caruso and Gill (1992) compared a 10 week aerobics program with a strength training program and a ‘control’ group (who actually participated in fencing, bowling and volleyball classes) in a sample of 34 female undergraduates. Although fitness and physical self-perceptions improved over time they did not differ between
groups. No significant improvements were observed for body image satisfaction or self-esteem. Once again, subjects had already been exercising in their chosen programme of physical activity, including the 'controls'. It is possible that changes in body image may only be observed at the start of an exercise program and plateau with continued participation.

A study by Tucker and Maxwell (1992) which, although still using a self-selected sample, administered pre-treatment measures at the start of a University “Beginning Weight Training” program. The sixty subjects enrolling to the 15-week program were compared to a group of 92 women who enrolled in general education classes at the same University, on measures of body cathexis, general well being and anthropometric measures of strength, body composition and weight. At the conclusion of the 15-week weight training programme, female lifters showed greater improvements in body image and general well being than the comparison group. Significant gains in muscular strength and decreases in skinfold measurements were also observed. Five variables were found to predict 60% of the variance for those who improved most in body satisfaction: greater pre-test body image dissatisfaction, greater body weight at the outset of the program, shorter in height, less previous involvement in weight training exercise and lower post-test skinfold. The failure to randomise subjects to groups however, limits the validity of the findings. The characteristics of those who enrolled in the weight lifting programme may have influenced the results. A later study, by the same author, further investigated the effects of a strength training programme in relation to an aerobic exercise programme this time using a randomised design.
Tucker and Mortell (1993) compared the effects of a 12-week home-based resistive training program to a brisk walking program in 60 middle aged, average weight women who responded to advertisements about the study. Subjects were required to exercise in their own homes, at a frequency of 3 times per week, completing diaries of each workout session. The outcome measures included body image, cardiovascular fitness and muscle strength. As predicted, walkers improved in cardiovascular fitness more than the lifters while the lifters improved more on muscular strength. Whilst significant improvements in body image were observed in both groups pre- to post-treatment, they were significantly greater in the lifting than the walking group. Tucker and Mortell suggested that the increased improvements in the lifters may have resulted from noticeable physical changes associated with regular weight training and/ or because of the positive feedback experienced with strength training. In such an environment, the need to increase weights to match increased strength is both observable and often documented by the participant. Using multiple regression, the variables predicting improvements in body image were: greater body dissatisfaction at pre-test, greater strength gains (in the lifting group) and higher training heart rates and perceived intensity scores at the conclusion of the study (in the walking group). The lack of a control group, however, prevents concluding that the changes noted are necessarily a function of the exercise components, rather than a non-specific effect of treatment. Both groups had also received a weekly health and fitness lecture which may also have contributed to the improvements.

A non-treatment control group was used in a comparison of CBT with an exercise intervention in the treatment of body image dissatisfaction (Fisher & Thompson,
Subjects were 54 women of normal weight with elevated levels of body image disturbance. The exercise intervention used in the study was a three weekly aerobics and weight lifting programme over 6 weeks. Both CBT and exercise treatments resulted in roughly equivalent positive improvements in body anxiety (measured by the Physical Appearance State and Trait Anxiety Scale; Reed, Thompson, Brannick & Sacco, 1991) and body satisfaction (assessed by the Body Dissatisfaction Scale of the Eating Disorders Inventory; Garner, Olmasead & Polivy, 1983), compared to the non-treated controls. Equivalent improvements, however, were observed in the non-treatment control group and both treatment groups, with regard to body image avoidance behaviours and improvement in the accuracy of size estimation. The improvement in the accuracy of size estimation in all groups may have been due to a practice effect, a problem with this type of measure that has already been discussed. The improvements in body image avoidance behaviours are difficult to explain and may have resulted from an uncontrolled exposure component when subjects’ body measurements were taken. An omission in the study design had been the failure to collect data to ensure that the non-exercise groups had not changed exercise habits. In addition, there was no corroboration of self-reported exercise levels with measures of cardiovascular fitness.

Very few studies of exercise and body image have been conducted using overweight or obese samples. Collingwood and Willett (1971) reported a significant increase in physical fitness, positive body attitude and body satisfaction (reduction in the ideal versus current self-discrepancy, which was attributable to an increase in current-self acceptance) from an intensive physical training program, over three weeks. Subjects were five adolescent obese males, enrolled to a YMCA program which consisted of a
total of thirty hours in the gym and pool. The improvements observed were in addition to a significant decrease in weight across the testing period.

The only other located study of exercise and body image using an obese sample is that by Foster, Wadden and Vogt (1997) who included exercise as part of a cognitive-behavioural weight loss program. In this study, 60 obese women were randomly assigned to one of four groups: i) diet plus CBT; ii) diet, CBT plus aerobic training; iii) diet, CBT plus strength training or iv) diet, CBT plus aerobic and strength training. The exercise conditions were three on-site, supervised training sessions per week, during the first 28 weeks of the program, reducing to two supervised group sessions per week and one home-based exercise session, during weeks 29-48. Significant weight loss and improvements in body image satisfaction, mood and self-esteem were observed in all treatment conditions, with no evidence of any differences between the groups. The authors collapsed the four treatment conditions and explored the relationship between weight loss and improvements in body image satisfaction, reporting that changes in body image were not related to changes in weight loss per se. No significant differences in changes in body image satisfaction were observed at week 24 among tertiles of participants who had lost 12kg, 20kg or 27kg. Further, at the end of treatment (after 48 weeks) similar improvements in body image were observed for those who had lost 9kg and those who had lost 25kg. The magnitude of improvement in body image satisfaction was illustrated by the comparison to norms for the MBSRQ. While pre-treatment body image satisfaction scores were lower than normative samples, at post-treatment they closely approximated such samples. An interesting finding in this study was that, despite a significant correlation between body image, mood and self-esteem at pre-
treatment, changes in self-esteem and mood were not related to changes in body image satisfaction at post-treatment.

Due to the large number of variables included in this study, unfortunately it is not possible to discern whether the improvements in body image satisfaction were due to weight loss, CBT treatment, or a combination of both. Since exercise was the only variable manipulated, the failure to find any group differences suggests that exercise did not account for the improvements observed in body image. However, due to the ‘strength’ of the base treatment (i.e. diet plus CBT), it is possible that any effects of exercise on body image may have been masked. CBT (and/or diet) may have produced a ceiling effect for improvements in body image.

Since improvements on body image satisfaction were not related to the amount of weight loss, Foster et al. (1997) speculated that there may be a threshold of weight loss that is necessary for improvements in body image satisfaction, after which no further improvements are observed.

4.2 Summary of the research on body image and exercise

It is only recently that the relationship between body image and physical activity has received much attention in the literature (Loland, 1998). Much of the research has been cross-sectional and has so far been dichotomised into those studies that report participation in physical activity to be related to a positive body image and those that document a negative relationship between body image and exercise. Most of these studies have used college students within the range of ‘normal’ ideal body weight as subjects. There have been few investigations of body image treatments
using body-image disturbed samples and no experimental study has been located which has specifically investigated the utility of exercise as an intervention for improving body image dissatisfaction in women who are overweight. Researchers have indicated the need for research that uses subjects outside the range of 'normative discontent' for body-image (Imm & Pruitt, 1991). While one study has hinted that there maybe greater improvements in body image for those who were heavier and had a poorer body image at the outset of a weight training program (Tucker & Maxwell, 1992) the subjects were “typical adult females” (mean weight 130 pounds).

4.3 Exercise and psychological health

In the early eighties, an extensive review of the literature on exercise and health by Folkins and Sime (1981) concluded that “almost all outcomes have been positive” (p.378). Fitness training seemed to help people cope with physical and psychological stresses and promote ‘well-being’ (as assessed on a wide variety of variables, including mood and self-concept).

Exercise and mood

In both clinical and non-clinical populations, both acute and chronic exercise (usually aerobic exercise) have often been shown to improve mood (Blumenthal et al., 1989; Callen, 1983; Doyne et al., 1987; Folkins et al., 1972; Frazier, 1989; Greist et al., 1979; Klein et al., 1985; Labbe et al., 1988; Morgan et al., 1970) and decrease anxiety (King, Taylor & Haskell, 1993; Labbe et al., 1988; Long & Haney, 1988; Martinsen et al., 1989; Steptoe et al., 1989).
The mechanisms supporting the observed changes in mood with exercise remain unclear (Berger et al., 1998) and have been related to the release of endorphins (Stein & Belluzi, 1978; Carr et al., 1981; Howlett et al., 1984); reductions in the amount of lactate (shown to play a key role in the production of anxiety symptoms; Kilkardy & Shephard, 1990); distraction from daily problems/ anxiety provoking cognitions (e.g. Bahrke & Morgan, 1978; Boutcher, 1993; Morgan, 1985), feelings of mastery and accomplishment (e.g. Bandura, 1977; Brown, 1991; Ledwidge, 1980), enjoyment (Motl et al., 1997; Sacks, 1995) or expectancy effects (Berger et al., 1998).

The data on whether aerobic fitness needs to be achieved to confer psychological benefits are inconsistent (Sobolski et al., 1987). In general, prospective trials have failed to support the hypothesis that changes in psychological health are associated with improvements in physical fitness (e.g. Hughes, 1984; King, Taylor, Haskell & DeBusk, 1989) and reductions in depression have been observed for both aerobic and anaerobic (weight lifting) activities (e.g. Doyne et al., 1987). For example, when comparing an eight week aerobic program (walking and jogging) with weight training and a delayed treatment condition in a group of clinically depressed women, Osissip-Klein et al. (1989) found that both exercise interventions lead to improvements in self-concept, depression and perceptions of fitness despite no actual improvements in aerobic capacity.

Moses et al. (1989), interestingly, found that a moderate intensity exercise program (walking-jogging at 60% of maximum heart rate) which had produced only marginal changes in cardiovascular fitness, resulted in improvements in tension and anxiety
(on the Profile of Mood States, McNair, Lorr & Droppleman, 1981) whereas a higher intensity program (walking-jogging at 70-75% of maximum heart rate) had not.

In an attempt to explore the mechanisms responsible for the psychological benefits associated with exercise, Brown et al. (1995) compared the effects of exercise alone or in combination with a cognitive component, in a sample of 69 healthy sedentary women. The comparison groups were i) moderate intensity walking (at 65-75% of maximum heart rate for 40-50 minutes, 3 times a week); ii) low intensity walking (as before but walking at 45-55% of maximum heart rate); iii) low intensity walking combined with a ‘relaxation response’ (using a headset, subjects were required to listen to a relaxation tape whilst walking); iv) ‘mindful exercise’ (Tai Chi); and v) a non-treatment control. After 16 weeks, the ‘mindful exercise’ condition led to significantly greater improvements in mood than any of the other conditions, bar moderate intensity walking. Improvement in fitness were observed for both the moderate intensity and low intensity walking programs, which were only associated with improvements in mood in the former. Although support for the added benefits of a cognitive element were equivocal (mindful exercise led to significant improvements in mood whereas the added ‘relaxation response’ in the low intensity walking did not), the authors’ drew attention to the finding that improvements in mood occurred independently of changes in fitness in the Tai Chi condition. Although Tai Chi had been administered in a group setting, which may have contributed to improvements in mood, this would not explain the mood improvements observed with the moderate intensity walking which was completed individually.
Other researchers have identified the need to distinguish between the effects of exercise and the possible confounding effects due to the social consequences of participating in supervised activities. For example, Gillett (1988) found that many women reported the main reason for exercising was socialisation and interaction with other women.

Thus, it appears that, although biological factors may relate to the psychological improvements associated with exercise, participation in physical activity may be more important than improvements in aerobic fitness per se. Physiological theories of the mental health benefits of exercise fail to adequately account for the similar psychological gains observed for both aerobic and anaerobic activities (e.g. Doyne et al., 1987) or the enhancement in mood with ‘mindful’ exercise (Brown et al., 1995).

Exercise and self-esteem

The results on the impact of exercise on self-esteem are equivocal in the literature. A number of studies suggest that long term exercise training programs contribute to self-concept/ self-confidence/ self-esteem in college aged (e.g. Folkins et al., 1972; Maloney et al., 1986; Skrinar et al., 1986; Trujillo, 1983) and middle aged women (e.g. Hanson & Neddle, 1974; Long & Haney, 1988; Penny & Rust, 1980). Frequently, however, there have been failed attempts to find a relationship between physical exercise participation and global self-esteem (Blumenthal et al., 1989; Kowal et al., 1978; Neale et al., 1969; Sonstroem, 1974). For example, Blumenthal et al. (1989) did not find improvements in global self-esteem in a 16 week aerobic exercise program. In the study by Brown et al. (1995) detailed above, self-esteem improved significantly in all groups, including the controls and therefore could not
readily be attributed to exercise. An interesting finding to note, however, was that satisfaction with physical attributes (which was assessed as one of the aspects of self-esteem), improved to a significantly greater extent in the women assigned to the moderate intensity walking program than those assigned to the other conditions.

Caruso and Gill (1992) criticise the methodological deficiencies, inadequate measurement instruments, lack of theory and failure to consider the multidimensionality of self-esteem for these inconsistencies. McAuley, Mihalko and Bane (1997) argue that the majority of the studies have been cross sectional, examining relationships between exercise and self-esteem at one time point and have over-relied on the assessment of global self-esteem, excluding the examination of multidimensional and hierarchical models.

In one such multidimensional model of self-esteem, Sonstroem and Morgan (1989) propose that changes in physical self-efficacy (beliefs and conviction that one can perform an activity) are instrumental to changes in two second order components of self-esteem: 1) physical competence (the evaluation of one’s physical fitness) and 2) physical acceptance (self-perceptions of one’s body). They argue that it is changes in these lower levels (physical self-efficacy, physical competence and physical acceptance) that are instrumental to changes in physical self-worth and in turn, global self-esteem. Relating this model to exercise, Sonstroem and Morgan (1989) suggest that physical training results in improvements in physical self-efficacy which in turn influences both physical self-worth and global esteem.
In an investigation of a 20-week, instructor-led brisk walking program on self-esteem in previously sedentary middle-aged adults, McAuley et al. (1997) found some support for this model. Greater improvements were recorded in the lower order components of self-esteem (physical condition and physical self-worth) than were observed for global self-esteem. The authors recommended that the appropriate constructs of self-esteem be utilised in research.

5. **BRISK WALKING AS EXERCISE**

5.1 **The impact of walking on physical and psychological health**

"The pleasurable and therapeutic, psychological and social dimensions of walking, whilst evident, have been surprisingly little studied"  
Morris & Hardman (1997), p.307

It is often asked whether fast walking is intense enough to produce a cardiovascular training effect. A number of studies have shown that the majority of adults are able to attain heart rates during brisk walking that are above the training threshold (>70% of HR max) (Porcari et al., 1987; Pollock et al., 1971). Duncan et al. (1991) randomly assigned a group of sedentary women aged 20-40 years to walking programs of differing intensities. When they compared ‘strollers’ (walking at 56% of HR max) with ‘brisk walkers’ (walking at 67% of HR max) and ‘aerobic walkers’ (walking at 86% of HR max) they found cardiovascular fitness improved over a 24 week period in a dose respondent manner, concluding that walking at a brisk to aerobic pace leads to meaningful improvements in cardiovascular fitness.

Brisk walking is roughly calculated as walking between 4.8 and 6.4 km an hour, between 60 and 80% of maximum heart rate. This corresponds approximately to
between 105 and 135 beats per minute. When asked to walk ‘briskly’ most inactive men and women attempt a pace at about 70% of maximum heart rate (Hardman, Jones & Norgan, 1992). Morris and Hardman (1997) recommend walking as one of the few feasible exercise regimens for overweight individuals due to poor cardiovascular capacities which may make other exercise such as jogging or aerobics hazardous. They report that has been recent growing evidence of the beneficial effects of walking in the treatment of hypertension, prevention of heart attack and reduction in mortality.

Recent recommendations by the Centres for Disease Control and Prevention (CDCP) and the American College of Sports Medicine (ACSM) recommend 30 minutes of moderate intensity exercise (including activities such as walking and gardening as well as the usual sports activities) on at least 5 days a week (Pate et al., 1995). Exercise does not necessarily have to be undertaken in one session to produce the required health and fitness benefits. Using the new exercise guidelines, Snyder et al. (1997) requested thirteen overweight women to walk for 30 minutes a day at 50-65% of maximum heart rate, in three episodes each of ten minutes duration. To verify compliance, subjects had to randomly present for supervised walking and provided diaries for other times. They reported that half of the group showed improvements in aerobic capacity, weight loss and improved insulin. Those that showed these improvements were characterised by being older, having lower maximal aerobic capacity and greater body fat at baseline.

Although a number of studies previously detailed, have reported psychological benefits associated with brisk walking as exercise (Brown et al., 1995; McAuley et
al., 1997; Moses et al., 1989; Tucker & Mortell, 1993) two other studies need mentioning having reported improvements in self-esteem and general well-being following brisk walking programmes of shorter duration (6 and 8 weeks). In the first study, Cramer, Nieman and Lee (1991) found that a group of mildly obese women (10-40% overweight) randomly allocated to a 15 week walking program (walking at 60% of maximum heart rate for 45 minutes on 5 days a week) or a non-walking control group improved significantly on well-being, using the General Well-Being Schedule (Fazio, 1978). The improvements in well-being were observed after six weeks of the walking program, as were improvements in fitness. Outcome measurements also included the Profile of Mood States (POMS; McNair et al., 1981) which did not improve from pre to post program. Cramer suggested that the POMS may lack the sensitivity necessary to detect change in mood states, in her group of ‘psychologically healthy’ adults. In this study, rates of attrition were recorded at 30%.

Palmer (1995) examined the effects of an eight week walking program in 27 female volunteers (aged 29-50 years), randomly assigned to a supervised walking program or a non-treatment control group. Walkers were required to walk at a pace fast enough to reach a target heart rate of 60-70% of estimated heart rate maximum. All walking sessions were supervised and increased from 20-50 minutes over the eight week period (the study omitted to report the frequency with which subjects were required to walk). Improvements in diastolic blood pressure and cardiovascular fitness for the walking group indicated the fitness value of the program. Psychological outcome measures included self-esteem (Rosenberg Self-Esteem Inventory) and depression (Center of Epidemiological Studies-Depression Scale;
Radloff, 1977). Self-esteem increased more in the walking group than controls but there were no differences in depression. Palmer discusses whether the improvements in self-esteem were related to number of non-exercise variables such as acquisition of a new skill, increased social contact, attention from the research team or completing a challenging program. She hypothesised that the failure to find improvements in scores on depression may have been due to the fact that, as a group, the subjects were not clinically depressed.

5.2 Compliance

Attrition is a significant problem in most exercise programs (Gillett, 1988; Biddle and Fox, 1989). Fifty percent of people who begin an exercise program drop out in the first 3 months (Dishman, 1988). For those who remain in exercise programs, rates of program compliance are difficult to assess accurately due to reliance on subjects’ self-reports of levels of activity.

Walking should have a higher compliance rate than other activities as it can easily be incorporated into a busy schedule and does not require any special skills (Cramer et al., 1991). In line with WHO (1998) recommendations, the increase of daily activity and low intensity leisure pursuits are more likely to achieve long term increases in physical activity than occasional vigorous activity.

Perri et al. (1997) compared the adherence rates of a group-based and a home-based walking program among obese women participating in a weight loss program. The walking regimen required subjects to walk for 30 minutes a day on 5 days a week. Although both groups displayed significant improvements in exercise participation,
fitness, eating patterns and weight loss, the home-based program reported higher rates of exercise participation than the group-based condition, although this may have been due to self-report bias.

Through the use of diaries and random presentation for supervised walking, Snyder et al. (1997) reported that an intermittent brisk walking program had an adherence rate above 80% in a sample of obese women, over 32 weeks. The adherence data were corroborated by a significant correlation between reported adherence and change in aerobic capacity (r=0.64) i.e. those with greater adherence showed more improvements in aerobic capacity.

Gintner (1988) has suggested several ways of encouraging the maintenance of exercise such as providing personalised feedback on exercise through the program, flexible goal setting by the participant, and identification of 'high risk' situations and coping plans.

5.3 Predicting exercise participation and adherence
Recent research has suggested that 'social physique anxiety', defined as the dispositional tendency to become apprehensive about having one's body evaluated in social settings (Hart, Leary & Rejeski, 1989), maybe partly responsible for the poor exercise uptake and adherence in many populations (Hart et al., 1989; McAuley, Bane & Mihalko, 1995). Although the work in this area is quite new, a number of findings have shown that scores on the social physique anxiety scale (SPAS; Hart et al., 1989) are related to affect and behaviour in exercise settings. The Social
Physique Anxiety Scale (Hart et al., 1989) may therefore be useful in exploring exercise uptake and adherence.

**AIMS OF THE CURRENT STUDY**

The main aim of the current study is to evaluate the impact of a brisk walking program on body image satisfaction, mood, physical self-efficacy and self-esteem in a sample of overweight and obese women. The study will also examine the impact of the exercise program on physiological measures (fitness, anthropometric measures, blood pressure) and eating efficacy (which has been shown to improve incidentally in cognitive behavioural treatments of body image disturbance e.g. Rosen et al., 1995).

A second aim is to explore the relationship between body image dissatisfaction, age of onset of overweight, teasing history and self-esteem among an overweight/obese sample; and the association between habitual levels of physical activity and body image satisfaction.

**HYPOTHESES**

1) Levels of body image dissatisfaction and disturbance will vary across the sample. Those with child-onset overweight/obesity are expected to show the greatest disturbances.

2) Higher levels of body image dissatisfaction will correlate with lower self-esteem, only when appearance is considered an important aspect of self-evaluation.

3) Moderate intensity exercise is expected to lead to improvements in cardiovascular fitness, without any significant change in weight.
4) It expected that the moderate exercise program will lead to improvements in mood, physical self-efficacy and self-esteem.

5) Moderate intensity exercise is expected to enhance body image satisfaction, independently of weight loss.

6) Improvements in mood and body image satisfaction are expected to be associated with increased eating self-efficacy.

7) Those who show greater adherence to the exercise program instructions are expected to show the greatest improvements in mood, body image satisfaction, physical self-efficacy and self-esteem.

8) Drop-outs will be characterised by higher social physique anxiety at pre-test than those who complete the walking program.
CHAPTER 2

METHOD

1.1 Design

The study was a partial crossover design. Subjects eligible to participate in the study were assigned to either an eight week walking program or a waiting list control using an alternating procedure. During the second phase of the study, the waiting list control group were allocated the eight week walking program and re-assessed at completion.

1.2 Participants

Three hundred and fifty respondents answering newspaper advertisements about a study of health and well-being in overweight women were sent a questionnaire to complete. Two hundred and forty three responses were received (69% response rate). Twelve of these were excluded due to incomplete information and five were excluded due to a BMI < 25. For the remaining 226 female respondents, age ranged from 19–75 years (mean 45.8, sd=11.2). The mean BMI, calculated from self-reported weight and height, was 34.2 (sd=6.3). The majority (77.4%) had a BMI greater than 30.

Fifty six subjects were eligible to participate in the experimental phase of the study. They were not significantly different from the sample of respondents as a whole in
age or BMI. Their mean was 45.3 years (sd=9.8) and mean BMI was 35.9 (6.1). Most (91.1%) had a BMI>30 and were Caucasian (96.6%).

1.3 Ethical Approval

Ethical permission for this study was granted from the joint UCL/UCLH Committees on the Ethics of Human Research (see Appendix A).

1.4 Procedure

An outline of the study procedure can be seen in figure 1. Female participants were recruited through newspaper advertisements about a study of ‘health and well-being in overweight women’ (see Appendix B). The advertisements were carried in one national daily paper and several local papers distributed within the greater London area during April 1998. Those interested contacted the researcher (by telephone or mail) and were sent a questionnaire (see Appendix C) and a self-addressed envelope for return. Due to an overwhelming interest in the study and limited resources, questionnaires were only sent to the first 350 responding to advertisements.

Respondents were considered eligible to participate in the experimental phase of the study if they were i) over 18; ii) had a minimum body mass index of 25; iii) had no medical problems precluding participation in an exercise program; iv) were not already participating in an exercise program; v) expressed interest in, and were available to take part in the exercise program; and vi) had clearance from their GP to participate in the walking regimen.
Fig. 1 Design
The first 75 respondents who fulfilled the first five eligibility criteria (GP consent was obtained later) were sent a letter detailing the study (Appendix D) and asking for contact details of their GP. Fifteen of those who were supplied with further information did not respond with their GP’s contact details. A letter was sent to the other respondents who had expressed an interest in taking part in the study thanking them for completing the questionnaire and informing them that their name would be kept on a database should a place on the study later become available.

For those who did provide details of their GP (n=60), a letter was written to their GP requesting consent for participation in the study (see Appendix E). In the meantime, participants were alternately assigned\(^1\) to the waiting list control or experimental group. Participants were sent an appointment for an assessment at University College London. For the subjects who had been assigned to the experimental group, the appointment letter included a sentence that during the assessment they would have the opportunity to discuss the walking program designed for them. This sentence was omitted in the appointment letter sent to the waiting list control group (see Appendix D). Two respondents’ GP’s did not give consent to their participation and two respondents who were offered an initial assessment failed to attend.

Fifty six respondents attended the first assessment. After reading the information sheet (Appendix F) any questions were answered before subjects signed consent forms to their participation (Appendix F). Subjects completed baseline psychological assessments (see Appendix G) before physical measurements were taken. Blood

\(^1\) Allocation was 2:1 in favour of the control group for the first 15 subjects. This was to enable assessments for the waiting list controls to get underway, since they would require a longer follow-up (8 weeks waiting, 8 weeks intervention).
pressure was taken after subjects had sat quietly to complete the questionnaire. Weight and height were verified by weighing on digital scales and recording heights using a tape secured to the wall. Waist and hip measurements were recorded\(^2\). The subjects then completed the fitness assessment using the Techmuseh step test (see measures section). Subjects who were assigned to the waiting list control group were informed that a walking program would be written for them and were given another appointment *when space on the program was available* (in 8 weeks time). Subjects were encouraged to wait until their next appointment before starting brisk walking.

Subjects who were assigned to the experimental group (group E) were instructed on the walking program and given a written protocol (see Appendix H). A target heart rate range between 60-70% of estimated heart rate maximum (220-age) was calculated for each subject. Subjects practised the walking speed required to elevate heart rate to within the range specified, with the use of a heart rate monitor. Subjects were instructed on how to complete the diary sheet recording: the date and time of day walked, duration of brisk walking, exercise heart rate, distance walked (only for those who had a pedometer), their ratings of perceived exertion, and how they felt at the end of walking on a scale form 1-6 (1 anchored by feeling ‘excellent’ and 6 by feeling ‘very poor’). Subjects were asked to post or fax the diary sheet each week to the researcher. They could telephone or write any queries on the diary sheet, a copy of which can be seen in Appendix H. Another appointment was made for reassessment in 8 weeks.

\(^2\) Percentage body fat was initially analysed using a new piece of equipment designed to measure the electrical impedance of fat and lean tissue cells. Unfortunately, the equipment failed to provide reliable readings and was abandoned.
Subjects who did not return a diary sheet for a week were contacted. Mid-way through the program, subjects were sent a postcard praising their efforts and reminding them that they should be up to walking half an hour a day (see below).

All subjects were reassessed at the end of eight weeks. Psychological assessments were always given before physical measurements. Those who had completed the walking program were thanked for their participation and informed that they would be sent a follow-up questionnaire in the next few months. Those who had been in the waiting-list control group were explained the walking protocol in the same manner as above and practised their walking speeds before the assessment was completed. The same procedure for diary keeping and researcher contact was followed as before. Subjects were given appointments for 8 weeks time, when they were reassessed on all measures as before and informed of the follow-up questionnaire.

1.5 The intervention

The walking program was designed in line with the recommendations from the Centres for Disease Control and Prevention (CDCP) and the American College of Sports Medicine (ACSM). Subjects were required to build up to 30 minutes of brisk walking on 5 days a week. During the first week, subjects were required to walk briskly (reaching their target heart rate 60-70% of maximum heart rate) for between 5 and 15 minutes on 5 days a week. Brisk walking times increased by five minute increments every 2-3 days thereafter as specified in the written protocol (see Appendix H). By week four, all subjects were required to be walking briskly for half an hour, 5 days a week. This was to be the frequency and duration to be maintained until the end of week 8. In line with the CDCP and ACSM recommendations,
subjects were instructed that walking could be intermittent over two brisk walking sessions a day, each of 15 minutes. Fifteen of the subjects who started the walking program were either lent pedometers or had purchased their own to verify the distance walked.

1.6 MEASURES

An asterisk marks those that were used only once in the study.

Body Image

Several measures of body image were used, including affective, cognitive and behavioural measures:

Body Dysmorphic Disorder Examination* (BDDE; Rosen & Reiter, 1994). The BDDE is a self-report version of a clinical interview designed to assess the degree of body image dissatisfaction through the measurement of symptoms of body dysmorphic disorder (BDD). The self-report version assesses the severity of BDD symptoms over the past 4 weeks from questions assessing preoccupation with and negative evaluation of appearance, excessive importance of appearance in self-evaluation and avoidance of activities and places. In the current study, selected items were used from the scale, including those that operationalise the diagnostic criteria. Internal consistency (Cronbach’s alpha) for the items used in the current study was 0.91. Subjects were asked to answer all questions with reference to their body size or shape. Scores are summed to provide a total BDD score, ranging from 0-66. Item 2 on the modified BDD scale asks respondents to rate how often they have thought about their body size/shape in the past four weeks and felt upset as a
result. Scores (0-6) correspond to an approximate number of days ranging from 0 to 22-28 (think about it and feel upset every or almost every day).

**Body Image Avoidance Questionnaire (BIAQ; Rosen, Srebnik, Saltzberg & Wendt, 1991).** The BIAQ is a 19-item questionnaire that assesses frequency of body image related avoidance behaviours e.g. "I wear baggy clothes". Behaviours are rated between 0 (never) and 5 (always) and the scale score is the sum of the 19 items ranging from 0-95 (internal consistency =0.89, test-retest reliability=0.87) with higher scores reflecting greater avoidance behaviours.

**Body Satisfaction Scale (BSS; Slade, Dewey, Newton, Brodie and Kiemle, 1990).** A modified version of the BSS was used in the current study. The original BSS consists of 16 items to measure satisfaction with head and body parts. Only the items relating to body parts were used in the study and the following modifications were made: (1) satisfaction with arms was further differentiated between satisfaction with upper and lower arms, (2) satisfaction with legs was further differentiated between satisfaction with thighs and calves and (3) items were included to assess satisfaction with waist, hips and buttocks. The modified BSS consisted of 9 items reflecting satisfaction with various body parts and three items reflecting satisfaction with more general muscle tone, weight and overall appearance. Responses were recorded using a 7 point Likert-type scale ranging from very satisfied (1) to very dissatisfied (7), scores ranging from 12 to 84, with higher scores indicated greater body dissatisfaction. Internal consistency for the 12 items was 0.85.
Physical Appearance State and Trait Anxiety Scale (PASTAS; Reed, Thompson, Brannick & Sacco, 1991). The eight-item weight subscale of the PASTAS was used in the current study, measuring state anxiety only. The state version has been validated using three different situations designed to elicit low, medium and high anxiety (Reed et al., 1991). Subjects in the current study were asked to respond to the high-state condition, completing the scale whilst imagining “walking along a crowded beach in a swimming costume”. Internal consistency of the high-state scale is 0.9. Anxiety ratings on the Likert-type scale range from ‘not at all’ (0) to ‘exceptionally’ (4). Total scores on this scale range from 0 to 32, with higher scores indicating greater state anxiety.

Social Physique Anxiety Scale (SPAS; Hart, Leary and Rejeski, 1989). The SPAS is a 12 item scale assessing the extent to which individuals become anxious when others observe or evaluate their physiques. Consistent with recent research (e.g. Eklund & Crawford, 1994; Eklund, Kelley & Wilson, 1997) the wording of item 2 was altered to reflect a positive statement (i.e. I would worry about wearing clothes that make me look too thin or overweight). Subjects are asked to indicate the degree to which statements are characteristic or true of them on a five point Likert-type scale (Internal consistency = 0.9, test-retest reliability = 0.82). Scores range from 12-60 with higher scores indicating greater social physique anxiety.

Mood, Eating efficacy, Self-esteem and Expectancy

Beck Depression Inventory (BDI-II, Beck, Steer & Brown, 1996). The revised BDI is a 21 item scale yielding a range of scores from 0-63. Beck suggests the following guidelines for BDI cut-off scores in samples of patients diagnosed with
major depression: no or minimal depression is < 13; mild depression is 14-19; moderate depression is 20-28 and severe depression is 29-63 (Beck et al., 1996). Internal consistency is reported at 0.90.

**Weight Efficacy Life-Style Questionnaire (WEL, Clark, Abrams & Niaru, 1991).** The WEL consists of 20 items measuring five hypothesised dimensions of weight management: availability, negative emotions, physical discomfort, positive activities and social pressure (internal consistencies: 0.76, 0.87, 0.82, 0.70 & 0.89 respectively). Subjects are asked to rate their confidence in the ability to resist overeating in 20 situations, using a 10 point Likert-type rating. Total scale scores range from 0-180 with higher scores indicating greater confidence in the ability to resist overeating.

**Rosenberg Self-Esteem Scale (RSE, Rosenberg, 1965).** The RSE consists of 10 items measuring global self-esteem. Respondents are asked to rate the items on a 4-point Likert-type scale ranging from strongly agree to strongly disagree. Scores range from 10 to 40, with lower scores indicating higher self-esteem. Wylie (1989) reports internal consistency as ranging between 0.72 and 0.87 and test-retest coefficients of 0.85 and 0.63.

**Physical Self-Efficacy Scale (PSE, Ryckman, Robbins, Thornton and Cantrell, 1982).** The PSE measures perceived competence in performing tasks involving the use of physical skills. The scale comprises two sub-domains: perceived physical ability and physical self-presentation confidence. Only the 10 item perceived physical ability scale was used in the current study, comprising items such as “I have
excellent reflexes”, “My physique is rather strong”. Responses are recorded on a Likert-type scale, ranging from strongly agree (1) to strongly disagree (6). Total scores range from 10 to 60 with higher scores indicating greater perceived physical ability (internal consistency =0.74, test-retest reliability=0.85).

Expectancy checks
Four items were completed by subjects to indicate the extent to which they expected the walking program to improve their fitness, physical appearance, psychological well being and overall health status. These items were repeated once the walking program had been completed. A four-point Likert type scale (to a very great extent (1) to not at all (4)) was used for responses. Higher scores indicate lower expectancies. These measures were repeated at post-test to examine the perceived impact of the walking program.

Teasing
Perception of Teasing Scale* (POTS, Thompson, Cattarin, Fowler & Fisher, 1995). The POTS assesses an individual’s history of being teased about physical appearance. The questionnaire comprises 6 weight-teasing and 5 competency items and subjects rate teasing items for frequency (never-very often). For the purposes of the current study only the weight-related teasing scale was used with an extra item to assess the frequency with which subjects were told they “would never be a success because of [their] weight”. Subjects were asked about teasing during childhood (as in the original scale) and also about the frequency of teasing over the last year. Scores range from 7-35, with higher scores indicating greater teasing frequency. Internal
consistency for the seven item childhood teasing scale was 0.96 and 0.91 for the scale assessing teasing frequency over the last year.

Exercise Measures

Leisure Time Exercise Questionnaire (Godin & Shephard, 1985). The Leisure time exercise questionnaire is a simple measure of 'strenuous', 'moderate' and 'light' exercise behaviour of at least 15 minutes duration, over a 7 day time period. Test-retest reliability coefficients of the measure were reported as 0.94, 0.46 and 0.48 for self-reports of strenuous, moderate and light exercise. The questionnaire was slightly modified in the current study to provide an estimate of exercise behaviour over the past 8 weeks. Respondents were asked to rate the number of weeks in the past 8 that they had taken part in strenuous, moderate and mild levels of activity of at least 15 minutes duration. Subjects were then asked to rate the average number of times they participated in each level of activity in a week. Total exercise scores within each category (strenuous, moderate and mild) were calculated by multiplying the number of weeks they exercised by the average number of times per week.

The Techumseh Step Test (Katch & McArdle, 1983). The step test provides a measure of cardiovascular fitness. Subjects are required to step up and down on an 8-inch high step for 3 minutes, keeping in time with a metronome set at 96 beats per minute. Heart rate is measured at the end of the three minutes stepping (maximum heart rate) and again at 30 seconds (heart rate recovery).
Rating of Perceived Exertion (RPE, Borg, 1962). The RPE is a popular scale used to indicate intensity of exercise. The scale ranges from 6 (very, very light) to 20 (very, very hard) and scores have been shown to correlate highly with actual heart rates (0.8-0.9, Borg (1982)).

Exercise attitudes and beliefs

Exercise knowledge*. This scale comprises 7 items taken from the London Health and Fitness Questionnaire (LHFQ; Rowland, Dickenson, Newman, Ford & Ebrahim, 1994). Although in keeping with the format of the questionnaire, responses are recorded on a four point Likert-type scale ('strongly agree' (1) to 'strongly disagree' (2)) items are marked as either correct or incorrect.

Exercise beliefs. This scale comprises 6 items, 4 of which comprise the benefits of exercise scale developed by Gecht, Connell, Sinacore & Prochaska (1996). An additional two items were added “exercise improves muscle tone” and “exercise improves overall appearance/shape”. Responses are recorded on a four point Likert-type scale ('strongly agree' (1) to 'strongly disagree' (4)). Individual item responses were summed to create a single score (ranging from 6-24) with lower scores reflecting more positive beliefs about the benefits of exercise (Chronbach’s alpha=0.87).

Barriers to exercise participation. This scale comprises 13 items. Eleven of the items are taken from the LHFQ, with an additional two items “I dislike wearing work-out clothing” and “exercising makes me feel unattractive” incorporated into the scale. Responses are recorded on a four point Likert-type scale ('strongly agree' (1)
to ‘strongly disagree’ (4)). Individual item responses were summed to create a single score (ranging from 13-52) with lower scores indicating greater perceived barriers to exercise participation (Cronbach’s alpha=0.80).

**Physical Measurements**

**Heart rate.** A cardiosport heart rate monitor (START 2) was used to measure heart rate at the end of the 3 minute techumseh step test (heart rate maximum) and 30 seconds after stopping (heart rate recovery). The heart rate monitor continuously measures HR and ECG accuracy and is displayed on the heart rate receiver as beats per minute.

**Blood Pressure.** Diastolic and systolic blood pressure were measured using a digital blood pressure meter (UA-751).

**Waist and hip measurements.** Researchers have recently suggested that it is the distribution of fat, in particular excess abdominal fat, that is a more important indicator of the health risks associated with obesity rather than excess fat per se (e.g. James, 1996).

Waist circumference (in cm) was measured at the narrowest point and hip measurements at the widest point.
CHAPTER 3

RESULTS

The results chapter is divided into seven sections. Section one presents descriptive information about the sample (n=226) from which the experimental (group E) and waiting-list control (group C) groups were randomly selected. Section two investigates the relationship between weight, weight history, body image and self esteem for the whole sample. Current levels of physical activity are presented in section three together with the relationships between activity level, body image variables and self esteem. The experimental phase of the study is the focus of the remaining sections. After investigating differences between those who completed the experimental phase and those who dropped out of the study, section four compares the outcomes in group E and group C for those who completed assessments at time two. Section five further investigates the changes when group C were crossed to active treatment. Section six explores the impact of walking for those who reported high levels of compliance with the program, compared to those who complied to a lesser extent. The final section presents participants' perceptions of the walking program, reasons for attrition and information collected at two month follow-up for those who completed the study.

DATA ANALYSIS

Independent t-tests, and the non parametric equivalent (Mann-Whitney U) were used to compare the differences between age of onset of overweight/obesity and body image variables, self-esteem and teasing history in the whole sample. Correlational
analyses (Pearson Product Moment) were applied to further explore the relationship between teasing history and measures of body image disturbance and self-esteem. One way analyses of variance were used to explore the initial differences in body image dissatisfaction and self-esteem by current activity levels.

Analyses of variance and chi-square tests were used to compare baseline characteristics among group E, group C and the respondents who completed the postal questionnaire only (group PD). Independent t-tests were used to compare the participants who completed and those who did not complete the walking program.

Changes in outcomes between group E and group C were compared using repeated measures ANOVA’s (General Linear Model) and followed up with pairwise comparisons. Paired samples t-tests were used to follow-up the changes in group C when they were crossed over to the exercise phase. Finally, repeated measures ANOVA’s were used to compare the pre-post walking program changes for ‘high’ and ‘partial’ compliers.
SECTION 1: CHARACTERISTICS OF THE SAMPLE

1.1 General Description

1.1.1 Age, BMI, age first overweight

Of the 350 questionnaires initially distributed, 66% were returned completed. A BMI of less than 25 was calculated for five of the respondents who were excluded from any analyses.

As can be seen in Table 1, the mean age of the whole sample (n=226 respondents) was 45.8 years (range 19-75 years). Participants' mean weight was 92.96 kg (range 57-177.8 kg). The mean Body Mass Index (BMI) of the sample was calculated from self reported weight and height and was 34 kg/m² with a range of 25 to 69 kg/m². Approximately three quarters (77.4%) of the respondents had a BMI ≥ 30. The median age at which respondents reported they were first overweight or obese was 16 years.

1.1.2 Attempts at weight loss over the past year

Sixty one percent of the sample said that they had dieted in the past year, 45% reported dieting on more than one occasion over the past 12 months. Thirty two percent reported that they had tried to lose weight through exercising.

1.1.3 Marital Status

The majority of the respondents (54.7%) were married, and a further 8% had a partner. Nearly one in five (19%) were separated or divorced, 13.3 % were single and 4.9% were widowed at the time of the study.
TABLE 1  Characteristics of the sample (n=226): Age, weight, BMI, age first overweight, body image dissatisfaction (BDD), social physique anxiety (SPAS), weight efficacy (WEL) and self-esteem (RSE)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>45.79</td>
<td>(11.42)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>92.96</td>
<td>(19.52)</td>
</tr>
<tr>
<td>BMI</td>
<td>34.19</td>
<td>(6.26 )</td>
</tr>
<tr>
<td>Age first o/w</td>
<td>19.0</td>
<td>(13.05)</td>
</tr>
<tr>
<td>BDD-total</td>
<td>36.45</td>
<td>(15.29)</td>
</tr>
<tr>
<td>BDD-item 2</td>
<td>4.12</td>
<td>(1.94 )</td>
</tr>
<tr>
<td>SPAS</td>
<td>47.71</td>
<td>(8.13 )</td>
</tr>
<tr>
<td>WEL</td>
<td>88.63</td>
<td>(35.6 )</td>
</tr>
<tr>
<td>RSE</td>
<td>25.29</td>
<td>(5.35 )</td>
</tr>
</tbody>
</table>

BDD-total refers to total score on the modified Body Dysmorphic Disorder Examination (range 0-66, high scores reflect greater body image dissatisfaction); BDD-item 2 refers to one item assessing the frequency with which an individual has thought about body size shape over the past month and been upset as a result (ranging from 0 'never' to 6 'every or almost every day')

1.1.4 Social Status

Using the five class, social classification model (ONS, 1998), 32% of respondents were unable to be classified. When stating their occupation, 17.8% described themselves as housewives, 10.2% were retired and 4% were students.

For those who could be classified by occupation (n=153); 31.4% were managerial and professional; 35.3% intermediate; 5.9% small employers and own account workers; 2.6% supervisors (craft related) and 24.8% were classified as working class.

1.1.5 Familial overweight and obesity

Over half (57.6%) of the sample reported that their mother was overweight or obese, and just under a third (32.6%) reported paternal overweight/obesity. The rates of sibling overweight/obesity were calculated for the 81.9% of respondents who
reported having at least one sibling. Of these respondents, 49.7% reported that they were the only child in the family who was overweight or obese, 33.5% reported at least one other sibling was overweight and 16.8% that all siblings were overweight.

1.1.6 Weight related teasing

The majority of respondents (84.9%) reported that they had been teased about their weight/shape at some point over the past year. Compared to those who reported never having been teased in the past 12 months (n=33), those reporting teasing were significantly younger (means=51.52 (sd=10.09) and 44.71 (sd=11.43) respectively; t(215)=3.20, p<0.01) and significantly more overweight (mean BMI=31.38 (sd=4.23) and 34.75 (sd=6.44) respectively; t(217)=2.9, p<0.01).

Approximately three quarters of the sample (76.5%) reported that people had made jokes about their weight at some time over the last year with 12.4% reporting that this had happened ‘very often’. Over one third (34.5%) reported that others had sniggered when they had walked into a room alone, 39.6% that people had pointed at them because they were overweight and 25.8% that people had told them they would never be a success because of their weight. When trying out sports in the last year, 38.3% reported that they had been laughed at because they were heavy.

1.2 Body image dissatisfaction

When prorated, to enable comparison with studies using the full scale BDDE-SR, the sample mean BDD score was 92.74 (sd=38.87). This score is in the range of clinical patients (mean=90.7 (sd=15)) and at the high end of negative body image (Rosen &
Reiter, 1994), who propose a cut-off of 60. Three quarters of the sample (76.1%) scored above 60 on their pro-rated BDDE score.

The percentage of respondents reporting moderate to extreme dissatisfaction and distress\(^1\) with their body size/shape was 83.1%. On average, the whole sample reported thinking about and being upset by their body size/shape for approximately half of the days in the previous four weeks, 40.6% reporting thinking about their body size/shape and feeling upset every or almost every day. Just under three quarters (71.1%) felt that their appearance was not normal.

Over half of the respondents (58.8%) reported moderate to extreme worry and embarrassment about their body size/shape when in public places with people they didn’t know, 61.1% reported moderate to extreme worry and embarrassment in social settings such as at work, in conversation and at parties. The majority of respondents (71.2%) reported some avoidance of public areas because of feeling uncomfortable about their body size/shape and 69.9% reported some avoidance of work or other social situations for the same reasons. Moderate to extreme avoidance of public and social situations was reported by 31.9% and 32.7% of respondents respectively. The majority (87.6%) reported at least some avoidance of physical activities due to feeling uncomfortable or self-conscious about body size/shape, with 54.5% reporting moderate to extreme avoidance of physical activity in the past month.

Ninety two percent reported some degree of negative self-evaluation due to their body size/shape, with 54% reporting that such negative self-evaluations were

\(^1\) Moderate to extreme scores were indicated by scores of \(\geq 4\) on the individual BDD item (range 0-6)
moderate to extreme. The majority (95.6%) agreed that their appearance was an important aspect of their self-evaluation, with 52.7% reporting that it was of moderate to extreme importance and one of the main aspects of self-evaluation in comparison to other areas such as personality, intelligence or quality of relationships.

The correlation (Pearson Product Moment) between BMI and body image dissatisfaction (BDD-total) was 0.29 (p<0.01). There was a high correlation between BDD and social physique anxiety (r=0.66, p<0.01).

The mean social physique anxiety (SPAS) score for the whole sample was 47.7 (sd=8.13), range 27-60 (higher scores indicating greater social physique anxiety). BMI did not significantly correlate with social physique anxiety (r=0.11).

1.3 Self-esteem

The mean self-esteem rating for the whole sample was 25.3 (sd= 5.35, range 10-38, low scores indicate higher self-esteem). The correlations between self-esteem (RSE) and body image dissatisfaction (BDD-total), social physique anxiety (SPAS) and BMI were 0.63, 0.55 and 0.17 respectively (p<0.05).

Those respondents who thought that appearance was of moderate to extreme importance as a means of self-evaluation (n=119) reported significantly lower self esteem than those (n=107) who reported it was of no importance or of only some importance to their self-evaluation (means =27.54 (sd=7.80) and 22.85 (sd=4.32) respectively; t(214)=7.14, p<0.01). When appearance was considered to be of moderate to extreme importance as an aspect of self-evaluation, the relationship
between body image dissatisfaction (BDD-total) and self-esteem was 0.57 (p<0.01). For the ten respondents who did not consider their appearance to be of any importance to their self-evaluation, the correlation between body image dissatisfaction and self-esteem was not significant (r=0.24, p=0.53). Using Fisher’s transformation procedure, these correlations do not differ significantly (Z_{obt}=1.04 < Z_{0.025}=1.96).

### 1.4 Weight-efficacy

The mean total weight efficacy life-style questionnaire score for the whole sample was 88.6 (sd= 35.6) out of a possible 180 (higher scores indicating greater confidence in the ability to resist overeating). There was no relationship between BMI and efficacy for weight control (r=0.03).

### 1.5 Pre-treatment levels of depression

Levels of depression had been assessed only in those who participated in the experimental phase of the study (n=56). For these subjects, the mean depression score on the BDI was 16.21 (sd=10.34, range 1-39), corresponding to ‘mild’ depression. BDI correlated significantly with body image dissatisfaction (r=0.47, p<0.01). There was no evidence of a correlation between BMI and depression (r=0.17, p>0.05).
SECTION 2: AGE OF ONSET OF OVERWEIGHT & OBESITY, TEASING HISTORY, BODY IMAGE AND SELF-ESTEEM

2.1 Age of onset of overweight/obesity

In order to examine the possible impact of the time of onset of overweight/obesity, the sample was divided into early-onset (onset at or before age 16 years) and adult-onset overweight/obesity (onset after 16 years). Mean and standard deviation scores are shown in Table 2; independent t-tests and Mann-Whitney (two tailed) were used to compare the two groups (data were missing for 3 respondents).

Subjects with early onset overweight/obesity were significantly younger (t(219)=3.04, p<0.01), significantly more overweight (weight t(206.31)=3.34, p<0.001; BMI t(204.3), p<0.001) and reported a higher maximum weight (t(218), p<0.01) than subjects who reported that they became overweight after the age of 16 (see table 2).

Subjects in the younger age onset group scored significantly higher on the modified Body Dysmorphic Disorder scale (t(217)=2.07, p<0.05) and on the Social Physique Anxiety scale (t(216)=2.7, p<0.01) indicating greater body image dissatisfaction and social physique anxiety. Self-esteem was significantly lower in those with childhood onset overweight/obesity than those with later onset (t(211)=2.66, p<0.01).

2.2 Frequency of teasing

As would be expected, significantly more of those who reported childhood onset obesity reported that they had been teased with some frequency about their weight or shape as children (91.2%) than those who reported being first overweight after the
TABLE 2:   Comparing age of onset of overweight/ obesity on age, weight, BMI, measures of teasing history (POTS), body image dissatisfaction (BDD), social physique anxiety (SPAS) and self-esteem (RSE)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Early onset (n=115)</th>
<th>Adult onset (n=108)</th>
<th>T-Test/Mann Whitney</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Age</td>
<td>43.42</td>
<td>(10.48)</td>
<td>47.98</td>
</tr>
<tr>
<td>Weight</td>
<td>97.16</td>
<td>(21.99)</td>
<td>88.67</td>
</tr>
<tr>
<td>BMI</td>
<td>35.65</td>
<td>(7.07 )</td>
<td>32.71</td>
</tr>
<tr>
<td>Maximum weight</td>
<td>100.56</td>
<td>(20.73)</td>
<td>91.90</td>
</tr>
<tr>
<td>POTS-C</td>
<td>18.79</td>
<td>(8.47 )</td>
<td>8.37</td>
</tr>
<tr>
<td>POTS-Y</td>
<td>14.03</td>
<td>(6.81 )</td>
<td>13.66</td>
</tr>
<tr>
<td>BDD-total</td>
<td>38.67</td>
<td>(14.46)</td>
<td>34.43</td>
</tr>
<tr>
<td>SPAS</td>
<td>49.19</td>
<td>(7.66 )</td>
<td>46.27</td>
</tr>
<tr>
<td>RSE</td>
<td>26.23</td>
<td>(5.08 )</td>
<td>24.31</td>
</tr>
</tbody>
</table>

* Non parametric statistic (Mann-Whitney U-test) reported since kurtosis ≥ ±2.

POTS- higher scores indicate greater teasing frequency, BDD-total- higher scores indicate greater body image dissatisfaction, SPAS- higher scores indicate greater social physique anxiety, RSE- higher scores indicate lower self-esteem.

age of 16 years² (23.4%, χ²(1df)=10.8, p<0.01). The frequency of being teased about weight/shape during childhood was significantly greater in those with child onset obesity than those with later onset (means= 18.8 and 8.4 respectively, Z(10.67), p=0.001).

The majority of both those with child-onset and adult-onset overweight reported that they had been teased about their weight/shape at some time over the past year (84.8% and 85.6% respectively). There were no significant differences between the two groups in the frequency of being teased during the last 12 months (see table 2).

² Further analyses showed that those reporting childhood teasing in the late onset group, also reported that they were first overweight after age 25. The reasons why any of those with adult onset obesity would report being teased about weight or shape as children will be explored in the discussion.
2.3 Impact of child-onset overweight/obesity

To look more closely at the impact of being overweight as a child on current functioning, the frequency of being teased about weight/size during childhood was correlated with current measures of body image dissatisfaction (BDD), physique anxiety (SPAS) and self-esteem (RSE) for the early-onset overweight/obese subgroup (n=115). As shown in Table 3, the frequency of being teased about weight/size during childhood was positively correlated with greater body image dissatisfaction ($r=0.47$, $p<0.001$), physique anxiety ($r=0.41$, $p<0.001$) and lower self-esteem ($r=0.41$, $p<0.001$) i.e. for those whose reported that they were overweight at or before 16 years, being teased about their weight and shape during childhood was associated with greater body image dissatisfaction, more social physique anxiety and lower self esteem as adults. These effects remained significant even after partialling out the effects of current weight and age (partial $r=0.47$, $p<0.001$; partial $r=0.44$, $p<0.001$; partial $r=0.41$, $p<0.001$ respectively).

One of the items on the POTS asked respondents how often they had been laughed at for trying out sports because they were too heavy. Of those with child-onset overweight/obesity, 70.2% reported that this had happened to them during their childhood, with 14.9% reporting that this had happened ‘very often’.

TABLE 3: Correlations between the frequency of teasing during childhood and current measures of body image dissatisfaction, social physique anxiety & self-esteem (n=115 Ss with early-onset overweight/obesity)

<table>
<thead>
<tr>
<th>POTS-childhood</th>
<th>Correlation after controlling for Weight and age</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDD-total</td>
<td>0.47***</td>
</tr>
<tr>
<td>SPAS</td>
<td>0.41***</td>
</tr>
<tr>
<td>RSE</td>
<td>0.41***</td>
</tr>
</tbody>
</table>

Note. Pearson correlation coefficients (two-tailed) are reported. ***$p<0.001$
The correlation between body image dissatisfaction and self-esteem in those with child-onset overweight/obesity was 0.71 (p(2-tailed)<0.01).

Ten subjects who were first overweight before age 16, reported that they had never been teased about their weight or shape during their childhood. Compared to those who reported at least some degree of teasing, they were currently less overweight (BMI means=36.17 (sd=7.21) and 30.79 (sd=1.97) respectively; t(41.5)=5.8, p<0.01) and reported a lower maximum weight (means=102.36 (sd=20.79) and 81.01 (sd=5.94); t(38.9)=7.64, p < 0.001). They also reported significantly lower body image dissatisfaction (BDD means=39.8 (sd=14.1) and 25.1 (sd=13.04); t(109)=3.2, p < 0.01), lower social physique anxiety (SPAS means=50.01 (7.19) and 41.0 (sd=7.13); t(10.9)=3.81, p <0.001) and higher self-esteem (RSE means= 26.59 (sd=5.14) and 22.60 (sd=3.37); t(106)=2.4, p < 0.05).

2.4 Frequency of teasing over the past year

Teasing frequency over the past 12 months was significantly correlated with current levels of body image dissatisfaction and self-esteem, in both early and adult-onset (see table 4).

<table>
<thead>
<tr>
<th>TABLE 4: Correlations between the frequency of teasing (past year) and current measures of body image dissatisfaction and self-esteem (n=226)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of teasing over the past 12 months</td>
</tr>
<tr>
<td>Child-onset</td>
</tr>
<tr>
<td>BDD-total</td>
</tr>
<tr>
<td>SPAS</td>
</tr>
<tr>
<td>RSE</td>
</tr>
</tbody>
</table>

Note. Pearson correlation coefficients (2-tailed) are reported. *p<0.05, **p<0.01
SECTION 3 CURRENT LEVELS OF PHYSICAL ACTIVITY

The following section describes the respondents’ current activity levels, their beliefs and attitudes towards exercise and the relationship between current levels of physical activity, body image dissatisfaction, social physique anxiety and self-esteem.

3.1 Level of exercise participation

The majority of the whole sample (61.95%) reported they had undertaken a ‘mild’ level of activity in the 8 weeks prior to completing the questionnaire. The average number of ‘mild’ exercise sessions of more than 15 minutes duration was reported as 2.1 per week. The most frequently reported type of ‘mild’ exercise was walking (reported by 84.4% of those who had exercised).

Just under half of the respondents (47.8%) reported a ‘moderate’ level of activity in the eight weeks prior to the study. The average number of moderate exercise sessions over the entire 8 week period was 7.1 (sd=13.31). Of the 108 subjects who reported participating in moderate exercise, the most common types of exercise were walking (48.2%), swimming (32.4%), line dancing (12.9%) and cycling (10.19%).

Nineteen percent of the whole sample reported that they had taken part in ‘strenuous’ exercise of at least 15 minutes duration in the 8 weeks prior to the study. The average number of times reported over the entire 8 week period was 2.4 (sd=7.2). Of the forty three respondents who reported this level of activity, 37.2% reported that this had been in the gym, 25.6% had taken an aerobics class, 16.3% had been cycling and 11.6% reported swimming.
3.2 Exercise knowledge

Approximately two thirds (67.1%) of the whole sample responded correctly to all seven of the exercise knowledge questions, 91.1% correctly responded to at least 6/7 of the items. See Table 5 for a summary of correct responses to individual items.

3.3 Beliefs about exercise

The mean score for the whole sample on the exercise belief scale was 10.45 (sd=3.1), out of a possible range of 6-23 (low scores indicating more positive beliefs about exercise). The percentage agreeing with individual response items can be seen in Table 5.

3.4 Barriers to exercise participation

The mean score for the whole sample on the barriers to exercise participation was 32.4 (sd=5.7), out of a possible range 13-52 (low scores indicating greater perceived barriers to exercise participation). The percentage agreeing with individual response items can be seen in Table 5. Three quarters of the sample (76.2%) agreed with the item that they were “not the sporty type” and 71.5% that they were “not very good at sport”. Amongst the respondents, 63.2% thought that they were “too fat” to exercise, 41.9% that they did not enjoy exercise and 57.7% agreed that they would “never keep it up”. Just over half of the sample (54.5%) did not like wearing ‘work-out’ clothing.
TABLE 5: *Exercise knowledge, beliefs and barriers to participation*

<table>
<thead>
<tr>
<th>Exercise Knowledge items</th>
<th>N</th>
<th>% scoring correctly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helps prevent heart disease</td>
<td>226</td>
<td>99.1</td>
</tr>
<tr>
<td>Develops your body strength</td>
<td>225</td>
<td>97.8</td>
</tr>
<tr>
<td>Helps you lose weight</td>
<td>206</td>
<td>89.4</td>
</tr>
<tr>
<td>Helps you to relax</td>
<td>193</td>
<td>83.6</td>
</tr>
<tr>
<td>Gives you high blood pressure*</td>
<td>221</td>
<td>95.6</td>
</tr>
<tr>
<td>Shortens your life*</td>
<td>225</td>
<td>97.4</td>
</tr>
<tr>
<td>Generally makes people feel depressed*</td>
<td>215</td>
<td>92.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beliefs about exercise</th>
<th>N</th>
<th>% agreeing with statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>improves muscle tone</td>
<td>226</td>
<td>98.7</td>
</tr>
<tr>
<td>improves overall appearance/shape</td>
<td>226</td>
<td>93.8</td>
</tr>
<tr>
<td>can make a person feel good physically and emotionally</td>
<td>226</td>
<td>96.0</td>
</tr>
<tr>
<td>gives a person more energy</td>
<td>226</td>
<td>90.7</td>
</tr>
<tr>
<td>helps people manage their problems better</td>
<td>223</td>
<td>64.6</td>
</tr>
<tr>
<td>helps people feel more attractive</td>
<td>225</td>
<td>78.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Barriers to exercising</th>
<th>N</th>
<th>% agreeing with statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am not the sporty type</td>
<td>223</td>
<td>76.2</td>
</tr>
<tr>
<td>I have not got the time to exercise</td>
<td>222</td>
<td>40.5</td>
</tr>
<tr>
<td>There is no-one to exercise with</td>
<td>222</td>
<td>54.1</td>
</tr>
<tr>
<td>My health is not good enough</td>
<td>222</td>
<td>24.3</td>
</tr>
<tr>
<td>I need to rest and relax in my spare time</td>
<td>222</td>
<td>41.4</td>
</tr>
<tr>
<td>I might get injured or damage my health</td>
<td>221</td>
<td>15.8</td>
</tr>
<tr>
<td>I don’t enjoy exercise</td>
<td>222</td>
<td>41.9</td>
</tr>
<tr>
<td>I would never keep up exercise</td>
<td>220</td>
<td>57.7</td>
</tr>
<tr>
<td>I am too fat</td>
<td>223</td>
<td>63.2</td>
</tr>
<tr>
<td>I can’t afford it</td>
<td>221</td>
<td>36.2</td>
</tr>
<tr>
<td>I’m not very good at sport</td>
<td>221</td>
<td>71.5</td>
</tr>
<tr>
<td>I don’t like wearing work out clothing</td>
<td>222</td>
<td>54.5</td>
</tr>
<tr>
<td>Exercising makes me feel unattractive</td>
<td>222</td>
<td>38.3</td>
</tr>
</tbody>
</table>

*responses disagreeing with these statements are scored as correct*
3.5 Current activity levels and body image dissatisfaction, social physique anxiety, self-esteem, exercise beliefs and barriers to participation: A cross sectional analysis

The following section compares the frequency with which the respondents reported participating in mild, moderate and strenuous types of activity in the past 8 weeks. Two hundred and seventeen subjects were classified according to the frequency with which they reported any type of exercise participation of more than fifteen minutes. Sixty two (28.6%) of respondents were classified as ‘inactive’ (no physical activity at all or physically active less than once a week), 56 (25.8%) as ‘low-active’ (at least moderately physically active 1-2 times a week), 33 (15.2%) as ‘moderate-active’ (at least physically active 3-4 times a week) and 66 (30.4%) as ‘high active’ (physically active five times a week or more).

The types of exercise each of the groups engaged in are shown in table 6. The most frequently reported type of exercise by each of the active groups was walking. Walking at normal speed was reported by 44.6% of the low-active, 66.7% of the moderate-active and 81.8% of the high-active groups. For the low-active group the next most frequently cited activities were swimming, reported by just under one quarter (23.2%), cycling (14.3%), yoga/ martial arts (14.3%) and brisk walking (12.5%). In the moderate-active group, after normal paced walking, the next most frequently cited activities were swimming (24.2%), brisk walking (21.2%), gym (21.2%) and cycling (12.2%). In the high-active group, 43.9% reported brisk walking as the second most frequent type of exercise engaged in, followed by swimming (19.7%) and cycling (10.6%).

---

3 Frequency of exercise data were missing for 9 respondents
One way analyses of variance indicated that there were no significant differences between the active and inactive groups on age, BMI, maximum weight, age first overweight, body image dissatisfaction, social physique anxiety, self-esteem or exercise beliefs (see table 7). A trend was observed for the perceived barriers to exercise scale ($F(3,224)=2.24$, $p=0.06$). As would be expected, those who exercised more frequently perceived fewer barriers to exercise participation than those who were inactive/low active. Correlational analysis (Pearson Product-Moment) on the total frequency of activity reported in the past 8 weeks, indicated a significant, albeit weak, correlation between exercise frequency and perceived barriers to exercise ($r=0.2$, $p<0.05$).

Since such a high percentage of subjects recorded normal paced walking as their most frequent type of exercise, the above analyses were run once more when subjects had been re-classified according to the frequency with which they reported participating in moderate or strenuous types of activity.
### Table 7: Means, standard deviations and significance levels for inactive, low-moderate- and high-active women for age, BMI, maximum weight, age first overweight, social physique anxiety (SPAS), body image dissatisfaction (BDD), self-esteem (RSE), exercise beliefs and barriers to exercise participation

<table>
<thead>
<tr>
<th>Variable</th>
<th>InAct (n=62)</th>
<th>LoAct (n=56)</th>
<th>ModAct (n=33)</th>
<th>HiAct (n=66)</th>
<th>F(df)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>44.57 (12.57)</td>
<td>45.66 (10.73)</td>
<td>43.58 (11.14)</td>
<td>46.51 (11.21)</td>
<td>0.47</td>
<td>ns</td>
</tr>
<tr>
<td>BMI</td>
<td>34.53 (6.90)</td>
<td>33.92 (6.09)</td>
<td>33.61 (5.24)</td>
<td>34.62 (6.56)</td>
<td>0.28</td>
<td>ns</td>
</tr>
<tr>
<td>MaxWGT</td>
<td>34.18 (16.94)</td>
<td>95.28 (21.80)</td>
<td>98.12 (17.88)</td>
<td>98.38 (20.73)</td>
<td>0.62</td>
<td>ns</td>
</tr>
<tr>
<td>Age first o/w</td>
<td>19.70 (12.98)</td>
<td>16.50 (13.34)</td>
<td>17.18 (11.70)</td>
<td>22.32 (13.41)</td>
<td>1.27</td>
<td>ns</td>
</tr>
<tr>
<td>BDD total</td>
<td>36.47 (15.97)</td>
<td>36.93 (15.02)</td>
<td>35.28 (16.52)</td>
<td>37.37 (13.96)</td>
<td>0.14</td>
<td>ns</td>
</tr>
<tr>
<td>BDD-item 2</td>
<td>3.97 (2.01)</td>
<td>4.28 (1.88)</td>
<td>3.88 (2.04)</td>
<td>4.33 (1.85)</td>
<td>0.68</td>
<td>ns</td>
</tr>
<tr>
<td>SPAS</td>
<td>47.72 (7.98)</td>
<td>47.71 (7.72)</td>
<td>47.97 (9.01)</td>
<td>48.22 (7.94)</td>
<td>0.05</td>
<td>ns</td>
</tr>
<tr>
<td>RSE</td>
<td>25.21 (5.14)</td>
<td>25.40 (5.15)</td>
<td>26.03 (5.97)</td>
<td>25.31 (5.36)</td>
<td>0.18</td>
<td>ns</td>
</tr>
<tr>
<td>Exercise beliefs</td>
<td>10.95 (2.71)</td>
<td>9.77 (2.99)</td>
<td>10.48 (3.21)</td>
<td>10.69 (3.54)</td>
<td>1.54</td>
<td>ns</td>
</tr>
<tr>
<td>Barriers to exercise</td>
<td>31.53 (5.60)</td>
<td>31.67 (3.71)</td>
<td>33.84 (5.80)</td>
<td>33.55 (6.96)</td>
<td>2.24</td>
<td>0.06</td>
</tr>
</tbody>
</table>

BDD- total refers to total score on the BDD (higher scores indicating greater body image dissatisfaction); BDD-item 2 refers to the frequency individual has thought about body size shape and been upset as a result (higher scores indicating greater frequency); Exercise beliefs- lower scores indicate more positive beliefs about exercise; barriers to exercise participation- lower scores indicate greater perceived barriers; RSE- lower scores indicating higher self esteem; SPAS- higher scores indicating greater social physique anxiety.

The majority of subjects (60.6%) were now classified as ‘inactive’ (no physical activity of at least moderate intensity at all or physically active less than once a week), 22.6% as ‘low-active’ (moderate or strenuous activity 1-2 times a week), 8.1% as ‘moderate-active’ (moderate or strenuous activity 3-4 times a week) and 8.6% as ‘high active’ (moderate or strenuous activity five times a week or more).

One way analysis of variance indicated a significant difference between the groups only with regard to perceived barriers to exercise (F(3,206)=8.78, p<0.01). Post hoc analyses (LSD) revealed that those in the high active group perceived fewer barriers to exercise participation than either of the two active groups or the inactive group.

The correlation between the frequency of moderate or strenuous exercise and barriers to exercise participation was 0.32 (p<0.05).
SECTION 4: THE EXPERIMENTAL PHASE OF THE STUDY

4.1 How comparable are the experimental and waiting list control groups and how representative are they of the whole sample?

Table 8 indicates that the subjects allocated to the experimental group (Group E) and the waiting list control group (Group C) were similar to the whole sample of respondents on a number of variables. One way analyses of variance indicated that there were no significant differences between group E, group C and the respondents for whom postal data only (PD group) was collected with regard to age, BMI, mean age at which subjects became overweight, body image dissatisfaction, number of reported days thinking about and being upset by their body size/shape, social physique anxiety, self-esteem or weight efficacy. A group difference did emerge in the percentages reporting child or adult onset overweight/obesity. Approximately a third (35.71%) of Group E reported they were first overweight at or before 16 years, compared to just over two thirds (67.86%) of group C ($\chi^2(1df)=5.79$, $p=0.02$).

Group E and Group C did not differ from the PD group on the beliefs about exercise scale ($F(2,220)=1.67$, $p>0.05$). On the barriers to exercise scale a significant difference between group E, group C and the PD group ($F(2, 211)=3.69$, $p=0.03$) was followed up by Bonferroni post hoc tests. Group C indicated significantly more barriers to exercise participation than the PD group ($p=0.02$). See figure 2.

There were no significant pre-treatment differences in levels of depression between group E and group C (depression had not been assessed in the whole sample).

---

4 BMI was measured in Group E and Group C as part of the baseline assessment. The correlations between self-reported BMI and actual BMI was high ($r=0.97$), $p=0.01$. 

---

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TABLE 8: Characteristics of the sample by group: Age, weight, BMI, body image dissatisfaction (BDD), social physique anxiety (SPAS), weight efficacy (WEL) and self-esteem (RSE).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Whole sample n=226</th>
<th>Group PD* n=170</th>
<th>Group E n=28</th>
<th>Group C n=28</th>
<th>1-way ANOVA p (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>45.79 (11.42)</td>
<td>45.93 (11.93)</td>
<td>47.32 (8.88)</td>
<td>43.36 (10.44)</td>
<td>ns</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>92.96 (19.52)</td>
<td>92.48 (19.79)</td>
<td>94.42 (11.1)</td>
<td>94.43 (24.38)</td>
<td>ns</td>
</tr>
<tr>
<td>BMI</td>
<td>34.19 (6.26)</td>
<td>34.0 (6.26)</td>
<td>33.83 (2.97)</td>
<td>35.73 (8.35)</td>
<td>ns</td>
</tr>
<tr>
<td>BDD-total</td>
<td>36.45 (15.29)</td>
<td>36.42 (15.66)</td>
<td>34.04 (15.8)</td>
<td>38.75 (12.5)</td>
<td>ns</td>
</tr>
<tr>
<td>BDD-item 2</td>
<td>4.12 (1.94)</td>
<td>4.12 (2.0)</td>
<td>3.96 (1.7)</td>
<td>4.29 (1.8)</td>
<td>ns</td>
</tr>
<tr>
<td>SPAS</td>
<td>47.71 (8.13)</td>
<td>47.76 (8.45)</td>
<td>45.96 (7.54)</td>
<td>49.14 (6.65)</td>
<td>ns</td>
</tr>
<tr>
<td>WEL</td>
<td>88.63 (35.6)</td>
<td>91.35 (35.03)</td>
<td>75.89 (33.19)</td>
<td>84.63 (39.41)</td>
<td>ns</td>
</tr>
<tr>
<td>RSE</td>
<td>25.29 (5.35)</td>
<td>25.17 (5.59)</td>
<td>25.27 (4.33)</td>
<td>25.96 (4.85)</td>
<td>ns</td>
</tr>
<tr>
<td>BDIb</td>
<td>16.46 (10.54)</td>
<td>15.96 (10.53)</td>
<td>-</td>
<td>-</td>
<td>ns</td>
</tr>
</tbody>
</table>

* 'Postal data only' group
b Beck Depression Inventory
c Independent T-Test

Fig. 2: Differences between group E, group C and 'postal data only' groups on barriers to exercise participation

Low scores indicate greater perceived barriers to participation.
4.2 RATES OF ATTRITION

4.2.1 Attrition in the waiting list control group

Two participants in group C did not complete assessments at time 2. Two other participants in group C who were unable to attend for their second assessment (one because of sciatica and one because of a bereavement) completed the questionnaire by post and have been included in the time 1-time 2 analyses.

The two participants from group C who did not complete assessments at time 2 were similar at baseline in age, weight, BMI, age at which they reported first being overweight, body image dissatisfaction (BDD), social physique anxiety (SPAS), depression (BDI), self-esteem (RSE), weight efficacy (WEL), physical self-efficacy (PSE) and exercise beliefs. These findings did not change when the two participants in group C who completed postal questionnaires at time 2 were included as “non-attenders”.

4.2.2 Attrition during the walking phase of the program

Thirteen participants in group E who left the study did not complete assessments at time 2.

Table 9 shows the means, standard deviations and significance levels of program completers (n=15) and non-completers (n=13) in group E. Those who were reassessed at the end of the eight week walking program did not differ significantly at pre-test from those who left the study on age, weight, BMI, body image dissatisfaction (BDD), social physique anxiety (SPAS), depression (BDI), or self-
esteem (RSE). One third of the completers and 38.46% of the non-completers reported child-onset overweight/obesity.

Participants in group E who completed assessments at time 2 reported greater self-efficacy for weight control at baseline than group E participants who left the study (t(25)=2.06, p=0.05) and had higher expectations that the walking program would improve their physical appearance (t(26)=3.03, P<0.01), psychological well-being (t(25.72)=2.34, P<0.05) and overall health status (t(25.31)=3.67, P=0.001).

**TABLE 9: Comparison of Group E completers and non-completers**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-completers (n=13)</th>
<th>Completers (n=15)</th>
<th>Independent t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Age</td>
<td>45.62</td>
<td>(11.41)</td>
<td>48.8</td>
</tr>
<tr>
<td>Weight</td>
<td>96.2</td>
<td>(8.09)</td>
<td>95.56</td>
</tr>
<tr>
<td>BMI</td>
<td>36.22</td>
<td>(2.24)</td>
<td>34.75</td>
</tr>
<tr>
<td>BDD-total</td>
<td>38.7</td>
<td>(17.1)</td>
<td>30.93</td>
</tr>
<tr>
<td>SPAS</td>
<td>44.92</td>
<td>(9.27)</td>
<td>46.67</td>
</tr>
<tr>
<td>BDI</td>
<td>17.38</td>
<td>(11.43)</td>
<td>15.67</td>
</tr>
<tr>
<td>RSE</td>
<td>24.85</td>
<td>(3.98)</td>
<td>25.69</td>
</tr>
<tr>
<td>WEL</td>
<td>61.0</td>
<td>(31.19)</td>
<td>87.0</td>
</tr>
<tr>
<td>Exercise Beliefs</td>
<td>11.23</td>
<td>(2.92)</td>
<td>10.33</td>
</tr>
<tr>
<td>Perceived Barriers to Exercise</td>
<td>32.9</td>
<td>(3.35)</td>
<td>31.79</td>
</tr>
<tr>
<td><em>Expectations exercise will improve:</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitness</td>
<td>1.85</td>
<td>(0.55)</td>
<td>1.6</td>
</tr>
<tr>
<td>Health status</td>
<td>2.15</td>
<td>(0.38)</td>
<td>1.53</td>
</tr>
<tr>
<td>Physical Appearance</td>
<td>2.46</td>
<td>(0.52)</td>
<td>1.87</td>
</tr>
<tr>
<td>Psychological Well-Being</td>
<td>1.92</td>
<td>(0.49)</td>
<td>1.47</td>
</tr>
</tbody>
</table>

WEL - higher scores indicate greater self-efficacy for weight control. Expectations on all scales (fitness, overall health status, physical appearance and psychological well-being) range from 1-4, lower scores indicating greater expectations.
4.3 EXPERIMENTAL AND CONTROL GROUP OUTCOMES

The following analyses were conducted on those who were re-assessed at time 2 (post intervention). This includes 15 (53.6%) of group E and 26 (92.9%) of group C. The two group C subjects who did not attend the second testing session, but completed postal questionnaires were included in the analyses (physical measurement data are missing for these two subjects).

4.3.1 Level of activity in the 8 week intervention period

Over the eight week intervention period, group E reported an average of 32 'moderate' exercise sessions of more than 15 minutes duration (sd=19.07). This was significantly greater than group C's average of 5 (sd=8.37) over the same period (t(17.17)=5.2, P<0.001). One of the experimental group subjects and half of the waiting list control subjects also reported that they had been restricting their calorie intake during the eight week intervention period.

4.3.2 Group E's Adherence to the walking program

From data recorded on their diaries, the 15 participants tested at post test walked for an average of 33.67 days (sd=7.1) out of a possible 40. On average, group E walked for 30 minutes on 18.33 days (sd=9.42). The program required them to walk for 30 minutes on 20 days. Just over half of group E (53.3%) walked for 30 minutes for the required number of days, 80% recorded walking for half an hour on at least 15 days. The average exercise heart rate recorded by group E was 113 beats per minute (sd=14.19), on average 65% of maximum Heart Rate. Their mean perceived exertion rating was 12.77 (sd=0.84). For those using a pedometer, the average distance covered for half an hour of brisk walking was 1.65 miles (sd=0.36).
4.3.3 Actual and perceived fitness

Table 10 shows the means, standard deviations and F ratios for the maximum heart rate from the 3 minute Techumseh test and heart rate at 30 seconds (heart rate recovery). Changes in heart rate were only able to be measured in eleven of the control subjects.

A group by time interaction was observed for the maximum heart rate ($F(1,24)=4.11$, $p=0.05$; see figure 3). Pairwise comparisons indicated that the mean maximum heart rate for group E was significantly lower on the 3 minute Techumseh test at post-test (time 2), while the group C's remained unchanged. Changes in heart rate recovery were not significant.

Subjects were asked to rate their fitness on a scale of 0 (not at all fit) to 10 (very fit) at time 1 and time 2. A significant time by group interaction ($F(1,39)=13.82$, $p=0.001$) indicated that self-reported fitness ratings only improved in Group E from pre to post intervention (see Table 10 and figure 4).

4.3.4 Weight, waist and hip circumferences, blood pressure

As can be seen in Table 11, there were no between or within-group weight changes observed pre to post test ($F(1,37)=0.31$, $p>0.05$). Small, yet significant reductions in both hip and waist circumferences were observed in the experimental group pre-post exercise, remaining unchanged in the controls (waist ($F(1,37)=4.55$, $p<0.05$; hip ($F(1,37)=8.97$, $p<0.01$).
TABLE 10  Actual and perceived fitness changes time 1- time 2 (completers only)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group E (n=15)</th>
<th>Group C (n=26)</th>
<th>Repeated Measures ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>F</td>
</tr>
<tr>
<td>HR max * Time 1</td>
<td>135.67 (15.9)</td>
<td>129.36 (20.48)</td>
<td>Group 0.26</td>
</tr>
<tr>
<td></td>
<td>130.0 (14.15)</td>
<td>129.18 (21.59)</td>
<td>Time 4.67</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 4.11</td>
</tr>
<tr>
<td>HR30s* Time 1</td>
<td>118.0 (18.7)</td>
<td>113.18 (19.14)</td>
<td>Group 0.17</td>
</tr>
<tr>
<td></td>
<td>113.87 (16.27)</td>
<td>112.82 (19.15)</td>
<td>Time 1.73</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 1.22</td>
</tr>
<tr>
<td>Perceived Fitness level</td>
<td>2.73 (1.87)</td>
<td>2.54 (1.86)</td>
<td>Group 4.22</td>
</tr>
<tr>
<td>Time 2</td>
<td>4.8 (2.04)</td>
<td>2.38 (2.62)</td>
<td>Time 10.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 13.82</td>
</tr>
</tbody>
</table>

*Heart rate only measured for 11 of the control subjects
Perceived fitness ranges from 0-10, higher scores indicating higher perceived fitness levels

Fig. 3:  Changes in maximum heart rate on the 3 minute Techumseh test

![Fig. 3: Changes in maximum heart rate on the 3 minute Techumseh test](image)

Fig. 4:  Changes in perceived fitness pre and post intervention

![Fig. 4: Changes in perceived fitness pre and post intervention](image)
TABLE 11: *Weight, waist and hip circumferences, blood pressure time 1-time 2, (completers only)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group E (n=15)</th>
<th>Group C (n=24)</th>
<th>Repeated Measures ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>F</td>
</tr>
<tr>
<td>Weight (Kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>95.56 (13.61)</td>
<td>95.03 (25.35)</td>
<td>Group 0.001</td>
</tr>
<tr>
<td>Time 2</td>
<td>95.32 (13.67)</td>
<td>95.74 (25.86)</td>
<td>Time 0.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 0.31</td>
</tr>
<tr>
<td>Waist circumference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>97.03 (9.07)</td>
<td>95.33 (14.28)</td>
<td>Group 0.04</td>
</tr>
<tr>
<td>Time 2</td>
<td>95.6 (9.49)</td>
<td>95.56 (14.44)</td>
<td>Time 2.39</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 4.55</td>
</tr>
<tr>
<td>Hip circumference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>118.8 (7.38)</td>
<td>118.40 (16.83)</td>
<td>Group 0.01</td>
</tr>
<tr>
<td>Time 2</td>
<td>117.07 (7.22)</td>
<td>118.42 (16.94)</td>
<td>Time 8.55</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 8.97</td>
</tr>
<tr>
<td>BP-systolic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>122.37 (12.45)</td>
<td>127.35 (16.32)</td>
<td>Group 0.09</td>
</tr>
<tr>
<td>Time 2</td>
<td>122.05 (14.69)</td>
<td>119.64 (12.47)</td>
<td>Time 7.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 6.25</td>
</tr>
<tr>
<td>BP-diastolic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>81.33 (6.75)</td>
<td>80.19 (9.65)</td>
<td>Group 0.84</td>
</tr>
<tr>
<td>Time 2</td>
<td>80.44 (10.46)</td>
<td>76.44 (8.77)</td>
<td>Time 5.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 1.99</td>
</tr>
</tbody>
</table>

A significant group by time interaction was observed for systolic blood pressure (F(1,37)=6.25, p<0.05). Pairwise comparisons revealed that scores in Group C unexpectedly improved to a greater extent than scores in group E from time 1 to time 2 (see figure 5). A main effect of time only was observed for diastolic blood pressure (F(1,37)=5.21, p<0.05). From figure 6, it appears that group C showed the greatest improvements across time although this was not significant (F(1,37)=1.99, P=0.17).
4.3.5 Psychological Variables

Table 12 shows the means, standard deviations and significance levels for measures taken at time 1 and time 2 for the 15 subjects remaining in group E at post-test and the 26 group C subjects who were re-assessed at time 2.

(i) Mood

A significant group by time interaction effect was observed on the Beck Depression Inventory (F(1,39)=5.42, p<0.05). Pairwise comparisons indicated that group E significantly improved in mood from time 1 to time 2 in comparison to group C (See figure 7). These improvements correspond with a mean shift from scoring in the ‘mild’ range at pre-test to a ‘minimal’ depression score at post test.
### TABLE 12: Psychological Outcomes: Means, standard deviations and significance levels time 1- time 2 by group (completers only)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group E (n=15)</th>
<th>Group C (n=26)</th>
<th>Repeated measures ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>F</td>
</tr>
<tr>
<td>BDI</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Time 1</td>
<td>15.67 (10.03)</td>
<td>15.69 (10.68)</td>
<td>0.81</td>
</tr>
<tr>
<td>Time 2</td>
<td>9.27 (9.33)</td>
<td>14.73 (9.91)</td>
<td>9.93</td>
</tr>
<tr>
<td>G*T</td>
<td>5.42</td>
<td></td>
<td>0.03</td>
</tr>
<tr>
<td>SPAS</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Time 1</td>
<td>46.67 (5.73)</td>
<td>49.42 (6.8)</td>
<td>4.96</td>
</tr>
<tr>
<td>Time 2</td>
<td>42.6 (7.61)</td>
<td>48.54 (7.48)</td>
<td>4.56</td>
</tr>
<tr>
<td>G*T</td>
<td>1.88</td>
<td></td>
<td>0.18</td>
</tr>
<tr>
<td>PASAS</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Time 1</td>
<td>22.53 (6.97)</td>
<td>25.85 (6.42)</td>
<td>4.84</td>
</tr>
<tr>
<td>Time 2</td>
<td>20.47 (6.72)</td>
<td>25.31 (5.9)</td>
<td>1.9</td>
</tr>
<tr>
<td>G*T</td>
<td>0.65</td>
<td></td>
<td>0.42</td>
</tr>
<tr>
<td>BSS</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Time 1</td>
<td>70.6 (11.08)</td>
<td>75.31 (6.8)</td>
<td>2.48</td>
</tr>
<tr>
<td>Time 2</td>
<td>68.47 (13.75)</td>
<td>72.77 (7.56)</td>
<td>4.58</td>
</tr>
<tr>
<td>G*T</td>
<td>0.03</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td>BDD-item 2</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Time 1</td>
<td>3.67 (1.76)</td>
<td>4.31 (1.85)</td>
<td>2.2</td>
</tr>
<tr>
<td>Time 2</td>
<td>2.6 (1.18)</td>
<td>3.42 (1.9)</td>
<td>12.22</td>
</tr>
<tr>
<td>G*T</td>
<td>0.11</td>
<td></td>
<td>0.75</td>
</tr>
<tr>
<td>BIAQ</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Time 1</td>
<td>38.8 (6.89)</td>
<td>41.19 (11.36)</td>
<td>0.72</td>
</tr>
<tr>
<td>Time 2</td>
<td>36.87 (10.25)</td>
<td>39.54 (9.03)</td>
<td>2.86</td>
</tr>
<tr>
<td>G*T</td>
<td>0.02</td>
<td></td>
<td>0.89</td>
</tr>
<tr>
<td>WEL</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Time 1</td>
<td>87.0 (31.37)</td>
<td>82.0 (39.72)</td>
<td>1.4</td>
</tr>
<tr>
<td>Time 2</td>
<td>115.8 (28.91)</td>
<td>93.3 (35.86)</td>
<td>22.73</td>
</tr>
<tr>
<td>G*T</td>
<td>4.52</td>
<td></td>
<td>0.04</td>
</tr>
<tr>
<td>RSE</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Time 1</td>
<td>25.69 (4.79)</td>
<td>25.88 (5.03)</td>
<td>0.34</td>
</tr>
<tr>
<td>Time 2</td>
<td>24.33 (5.07)</td>
<td>25.81 (5.61)</td>
<td>1.78</td>
</tr>
<tr>
<td>G*T</td>
<td>1.48</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>PSE</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Time 1</td>
<td>22.67 (4.75)</td>
<td>23.31 (5.43)</td>
<td>0.32</td>
</tr>
<tr>
<td>Time 2</td>
<td>25.93 (6.44)</td>
<td>23.27 (7.0)</td>
<td>4.04</td>
</tr>
<tr>
<td>G*T</td>
<td>4.23</td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td>Exercise Beliefs</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Time 1</td>
<td>10.33 (2.29)</td>
<td>11.23 (3.17)</td>
<td>1.0</td>
</tr>
<tr>
<td>Time 2</td>
<td>9.13 (2.97)</td>
<td>10.16 (2.72)</td>
<td>14.52</td>
</tr>
<tr>
<td>G*T</td>
<td>0.253</td>
<td></td>
<td>0.62</td>
</tr>
<tr>
<td>Barriers to</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Exercise</td>
<td>Time 1</td>
<td>31.79 (3.36)</td>
<td>2.93</td>
</tr>
<tr>
<td>Time 2</td>
<td>33.93 (3.97)</td>
<td>29.88 (4.88)</td>
<td>5.05</td>
</tr>
<tr>
<td>G*T</td>
<td>0.5</td>
<td></td>
<td>0.4</td>
</tr>
</tbody>
</table>

Higher scores indicate: greater dysphoria (BDI); greater social physique anxiety (SPAS); physical appearance state anxiety (PASAS); higher body dissatisfaction (BSS); more days thinking about body size/shape (BDDE-item 2); greater body image avoidance behaviours (BIAQ); greater self-efficacy for weight control (WEL); lower self-esteem (RSE), greater perceived physical ability (PSE); fewer positive beliefs about exercise and fewer perceived barriers to exercise participation.
(ii) **Body image variables**

Both measures of body anxiety (SPAS and PASAS) showed significant group differences (SPAS; \( F(1,39)=4.96, p<0.05 \), PASAS; \( F(1,39)=4.84, p<0.05 \); see figures 8 and 9). A significant main effect of time was also observed for the SPAS (\( F(1,39)=4.56, p<0.05 \)). There were no group by time interactions observed for the SPAS or the PASAS.

Both the BSS and the BDD item 2 showed significant main effects of time (BSS; \( F(1,39)=4.58, p<0.05 \); BDD item 2 \( (1,39)=12.22, p<0.001 \); see figures 10 and 11). Both group E and group C decreased in the number of days that they felt preoccupied and upset with their body size/shape and were slightly more satisfied with their bodies at the second testing session.

There were no between or within group effects observed for the Body Image Avoidance Questionnaire (BIAQ).
Fig. 8: **T1-T2 group differences on the SPAS**

![Social Physique Anxiety Scale](image)

Fig. 9: **T1-T2 group differences on the PASAS**

![Physical Appearance State Anxiety Scale](image)

Fig. 10: **Improvements in Body Shape Satisfaction, over time**

![Body Satisfaction Scale](image)

Fig. 11: **Reductions in the number of days preoccupied with size and shape in the last month, over time**

![BDD-item 2](image)
(iii) Weight Efficacy

There was a significant group by time interaction on the weight efficacy life-style questionnaire \((F(1, 37)=4.52, \ p<0.05)\). Post hoc analyses indicated that group E became significantly more confident pre to post intervention that they could control their weight (See table 12 and figure 12).

Further analyses of the 5 subscales comprising the weight efficacy life-style questionnaire yielded several effects. Post hoc analyses on the group by time interactions for the subscales negative emotion \((F(1, 39)=5.22, \ p<0.05)\) and physical discomfort \((F(1, 39)=5.81, \ P<0.05)\) indicated that group E reported greater increases in confidence, pre-post intervention, that they could resist eating in such situations than group C (see table 13). There was a significant main effect of time only for the availability \((F(1,39)= 12.12, \ p < 0.001)\) and social pressure sub-scales \((F(1,39)=7.85,\ p<0.01)\). A trend for a group by time interaction was observed for positive activities \((F(1,39)=2.77, \ p=0.1)\).

Fig. 12: Group by time interaction on the WEL

![Graph showing group by time interaction on the WEL](image)
### TABLE 13: Weight efficacy life-style questionnaire - 5 subscales: Means, standard deviations and significance levels time 1- time 2 by group (completers only)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group E (n=15)</th>
<th>GroupC (n=26)</th>
<th>Repeated Measures ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Availability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>14.93 (8.11)</td>
<td>12.28 (8.73)</td>
<td>Group</td>
</tr>
<tr>
<td>Time 2</td>
<td>19.6 (7.25)</td>
<td>14.46 (7.55)</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T</td>
</tr>
<tr>
<td>Negative Emotion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>12.47 (10.2)</td>
<td>19.92 (8.76)</td>
<td>Group</td>
</tr>
<tr>
<td>Post</td>
<td>20.2 (7.52)</td>
<td>14.04 (8.61)</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T</td>
</tr>
<tr>
<td>Physical Discomfort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>18.67 (8.36)</td>
<td>19.92 (8.76)</td>
<td>Group</td>
</tr>
<tr>
<td>Post</td>
<td>26.4 (5.79)</td>
<td>22.11 (7.28)</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T</td>
</tr>
<tr>
<td>Positive Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>22.47 (7.67)</td>
<td>20.42 (9.34)</td>
<td>Group</td>
</tr>
<tr>
<td>Post</td>
<td>26.8 (6.75)</td>
<td>21.81 (8.49)</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T</td>
</tr>
<tr>
<td>Social Pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>18.47 (7.74)</td>
<td>18.23 (10.55)</td>
<td>Group</td>
</tr>
<tr>
<td>Post</td>
<td>22.8 (8.05)</td>
<td>19.77 (9.56)</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T</td>
</tr>
</tbody>
</table>

Higher scores indicate greater self-efficacy for controlling eating in each situation.

(iv) Physical self-efficacy and self-esteem

A significant time by group interaction was observed on the physical self-efficacy scale \( (F(1, 39)=4.23, p<0.05; \) see table 12 and figure 13). Pairwise comparisons indicated that only group E improved in their ratings of physical ability pre to post test \( (\text{means}=22.67 \text{ and } 25.93 \text{ respectively}) \).

There were no significant changes observed pre-post intervention on the Rosenberg self-esteem scale either between or within groups \( (F(1,39)=1.48, p>0.05; \) see Table 12).
(v) Exercise beliefs and barriers to participation

The main effect of time indicated that both the exercise and waiting list control groups improved in their beliefs about the positive benefits of exercise \((F(1,39)=14.52, p=0.01)\) and reported fewer barriers to participation \((F(1,39)=5.05, p<0.05)\) from pre to post test (see table 12).
SECTION 5: RESULTS FROM THE CROSS-OVER PHASE FOR THE CONTROL GROUP

5.1 Rates of attrition

Post walking intervention assessments at time 3 were completed by 17 of the original 28 subjects assigned to group C (60.71%). The two control group subjects who dropped out of the program before the walking phase started and who have already been described were not included in the following analyses.

Table 14 shows the means, standard deviations and significance levels of program completers (n=17) and non-completers (n=9) in groups C. Those who were re-assessed at the end of the eight week walking program did not differ significantly from those who left the study on age, weight, BMI, body image dissatisfaction (BDD), social physique anxiety (SPAS), depression (BDI) or self-esteem (RSE). The majority of the group C non-completers reported child onset overweight/obesity (88.89%) compared to 58.82% of those who completed the walking phase of the study ($\chi^2(1df)=15.21$, $p<0.001$). There were no significant differences in the proportion of those with child and adult onset obesity who remained in the exercise phase (58% child-onset, compared with 42% adult-onset, $\chi^2(1df)=0.47$).

The differences between the completers and non-completers in group E on the weight efficacy scale (WEL) and expectations that the walking program would improve physical appearance, psychological well-being and overall health status were not replicated amongst the completers and non-completers in group C (see table 14).
5.2 Group C’s adherence to the program

The 17 people tested at post test walked for an average of 33.47 days (sd=7.15) out of a possible 40. On average, the group walked for 30 minutes on 17.47 days (sd=7.78). Just over half of group B (52.9%) walked for 30 minutes for the required number of days (i.e. 20), 64.71% recorded walking for half an hour on at least 15 days. The average exercise heart rate recorded by Group C was 108.8 beats per minute (sd=11.98), corresponding to approximately 62% of HR max. Their mean perceived exertion was 12.83 (SD=1.02). For those using a pedometer, the average distance covered for half an hour of brisk walking was 1.92 miles (sd=0.5).

In addition to exercising, 35.3% of group C reported that they had restricted their calorie intake over the past 8 weeks.

**TABLE 14: Comparison of completers and non-completers during the walking phase of the study (Group C)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-completers (n=9)</th>
<th>Completers (n=17)</th>
<th>Independent t-tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Age</td>
<td>41.22</td>
<td>(12.51)</td>
<td>46.06</td>
</tr>
<tr>
<td>Weight</td>
<td>91.23</td>
<td>(23.57)</td>
<td>97.04</td>
</tr>
<tr>
<td>BMI</td>
<td>34.86</td>
<td>(6.08)</td>
<td>36.5</td>
</tr>
<tr>
<td>BDD-total</td>
<td>38.67</td>
<td>(14.26)</td>
<td>39.06</td>
</tr>
<tr>
<td>SPAS</td>
<td>46.89</td>
<td>(6.51)</td>
<td>50.76</td>
</tr>
<tr>
<td>BDI</td>
<td>18.44</td>
<td>(11.22)</td>
<td>14.24</td>
</tr>
<tr>
<td>RSE</td>
<td>25.56</td>
<td>(4.80)</td>
<td>26.06</td>
</tr>
<tr>
<td>WEL</td>
<td>87.11</td>
<td>(35.48)</td>
<td>79.13</td>
</tr>
<tr>
<td>Exercise beliefs</td>
<td>9.67</td>
<td>(2.74)</td>
<td>12.06</td>
</tr>
<tr>
<td>Perceived Barriers to Exercise will improve:</td>
<td>31.44</td>
<td>(5.10)</td>
<td>29.06</td>
</tr>
<tr>
<td>Fitness</td>
<td>1.67</td>
<td>(0.50)</td>
<td>1.71</td>
</tr>
<tr>
<td>Health status</td>
<td>1.56</td>
<td>(0.53)</td>
<td>1.71</td>
</tr>
<tr>
<td>Physical Appearance</td>
<td>2.11</td>
<td>(0.93)</td>
<td>2.35</td>
</tr>
<tr>
<td>Psychological Well-Being</td>
<td>1.67</td>
<td>(0.50)</td>
<td>1.88</td>
</tr>
</tbody>
</table>
5.3 PRE- TO POST- WALKING PROGRAM DIFFERENCES IN GROUP C

The improvements observed in group E were followed up with paired samples t-tests once group C had completed the walking program. Differences between time 2 and time 3 for all variables were explored. One and two tailed P values are therefore presented.

5.3.1 Actual and perceived fitness

No significant improvements were observed for Group C on the maximum heart rate attained on the 3 minute Techumseh step test at time 3. There was a trend towards improvement in heart rate recovery (t(15)=1.45, p= 0.08) and a significant improvement in perceived fitness at time 3 (t(16)=5.83, p<0.001), see table 15.

5.3.2 Weight, waist and hip circumferences, blood pressure

When group C undertook the walking program no significant changes in weight were observed. Significant decreases in both waist and hip circumferences were noted post-exercise for the waiting list controls (waist; t(16)=4.91, p<0.001, hip; t(16)=2.06, p<0.05). There were no further improvements observed from time 2 to time 3 in the control group on either systolic or diastolic blood pressure.

**TABLE 15: Physical Outcomes for group C completers (n=17): Weight, waist and hip circumferences, blood pressure, actual and perceived fitness changes (time 2-time 3)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time 2</th>
<th>Time 3</th>
<th>T (df)</th>
<th>2-tailed</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>97.18 (26.7)</td>
<td>95.39 (25.84)</td>
<td>1.55 (16)</td>
<td>0.14</td>
<td>0.07</td>
</tr>
<tr>
<td>Waist</td>
<td>96.13 (14.76)</td>
<td>93.22 (13.74)</td>
<td>4.91 (16)</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Hip</td>
<td>119.88 (19.11)</td>
<td>118.55 (19.31)</td>
<td>2.06 (16)</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>119.4 (10.67)</td>
<td>119.1 (7.79)</td>
<td>0.14 (16)</td>
<td>ns</td>
<td>-</td>
</tr>
<tr>
<td>Diastolic blood pressure</td>
<td>77.1 (9.51)</td>
<td>77.03 (6.57)</td>
<td>0.04 (16)</td>
<td>ns</td>
<td>-</td>
</tr>
<tr>
<td>HR max *</td>
<td>130.94 (13.49)</td>
<td>129.81 (16.58)</td>
<td>0.36 (15)</td>
<td>ns</td>
<td>-</td>
</tr>
<tr>
<td>HR recovery *</td>
<td>115.94 (13.42)</td>
<td>111.69 (15.77)</td>
<td>1.45 (15)</td>
<td>0.17</td>
<td>0.08</td>
</tr>
<tr>
<td>Perceived Fitness</td>
<td>2.53 (2.4)</td>
<td>4.53 (1.84)</td>
<td>5.83 (16)</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

*Data were missing for one of the control groups at follow up due to equipment failure
5.3.3 Psychological Variables

Table 16 shows the means, standard deviations and significance levels for measures taken at time 2 and time 3 for the 17 group C subjects who completed the walking program.

(i) Mood

For those who completed the assessment at time 3, a significant improvement in mood was observed (BDI; $t(16)=2.33$, $p<0.05$). See table 16 and figure 14.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time 2 Mean</th>
<th>SD</th>
<th>Time 3 Mean</th>
<th>SD</th>
<th>T (16 df)</th>
<th>P 2-tailed</th>
<th>P 1-tailed</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDI</td>
<td>13.71 (10.37)</td>
<td>9.47 (7.83)</td>
<td>2.33</td>
<td>0.03</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPAS</td>
<td>49.00 (7.37)</td>
<td>47.18 (7.7)</td>
<td>1.43</td>
<td>0.17</td>
<td>0.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PASAS</td>
<td>24.24 (6.69)</td>
<td>22.94 (5.25)</td>
<td>0.76</td>
<td>ns</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSS</td>
<td>73.65 (7.57)</td>
<td>70.29 (8.63)</td>
<td>2.17</td>
<td>0.05</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDDE.2</td>
<td>3.12 (2.0)</td>
<td>2.53 (1.62)</td>
<td>1.03</td>
<td>ns</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIAQ</td>
<td>38.87 (10.42)</td>
<td>38.07 (10.5)</td>
<td>0.38</td>
<td>ns</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEL</td>
<td>93.81 (39.65)</td>
<td>109.35 (44.79)</td>
<td>3.94</td>
<td>0.001</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSE</td>
<td>25.33 (6.67)</td>
<td>23.13 (5.50)</td>
<td>2.44</td>
<td>0.03</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSE</td>
<td>23.71 (6.17)</td>
<td>25.59 (7.75)</td>
<td>2.22</td>
<td>0.004</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise beliefs</td>
<td>10.75 (2.57)</td>
<td>10.76 (2.66)</td>
<td>0.22</td>
<td>ns</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise barriers</td>
<td>30.53 (5.04)</td>
<td>33.53 (4.08)</td>
<td>3.8</td>
<td>0.002</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 14: Changes in mood over time

BDI across time

- group E
- group C
(ii) Body Image

The improvements over time observed in both groups E and C for body satisfaction (BSS) further improved for group C from time 2 to time 3 ($t(16)=2.17$, $p=0.05$). The difference in the mean number of days participants in group C reported being preoccupied and upset with their body size/shape did not significantly reduce from time 2 to time 3 and no changes were observed from time 2 to time 3 on the PASAS or the BIAQ (see table 16). A trend in the hypothesised direction occurred for the SPAS ($t(16)=1.43$, $p=0.09$).

(iii) Weight efficacy

Improvements were observed for group C pre to post walking intervention on the weight efficacy life style questionnaire (WEL; $t(15)=3.94$, $p<0.001$), see figure 15. The improvement in WEL scores pre to post intervention were significant for all subscales (see table 17).

Fig. 15: Changes in efficacy for weight control over time
TABLE 17  WEL subscales: Means, standard deviations and significance levels for Group C completers (n=17) t2-t3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time 2</th>
<th>Time 3</th>
<th>T (df)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Availability</td>
<td>14.29</td>
<td>(8.06)</td>
<td>18.65</td>
<td>(9.61)</td>
</tr>
<tr>
<td>Negative emotion</td>
<td>14.76</td>
<td>(9.0)</td>
<td>17.71</td>
<td>(10.11)</td>
</tr>
<tr>
<td>Physical Discomfort</td>
<td>22.76</td>
<td>(8.06)</td>
<td>26.12</td>
<td>(8.89)</td>
</tr>
<tr>
<td>Positive Activities</td>
<td>21.94</td>
<td>(8.71)</td>
<td>24.71</td>
<td>(9.82)</td>
</tr>
<tr>
<td>Social Pressure</td>
<td>18.29</td>
<td>(10.14)</td>
<td>22.18</td>
<td>(10.38)</td>
</tr>
</tbody>
</table>

(iv) Physical self-efficacy and self-esteem

Physical Self-efficacy improved significantly from time 2 to time 3 for group C (PSE; t(16)=2.22, p<0.05; see figure 16). Global self-esteem also significantly improved from time 2 to time 3 for group C (t(14)=2.44, p<0.05).

Fig. 16: Changes in physical self-efficacy over time

(v) Exercise beliefs and barriers to participation

At time 3, Group C indicated fewer perceived barriers to exercise on completion of the walking program than at time 2 (t(16)=3.8, p<0.01). There were no further improvement in scores on the beliefs about exercise from time 2 to time 3 (t(16)=0.22, p>0.05)
SECTION 6: EXPLORATORY ANALYSIS OF THE IMPACT OF THE WALKING PROGRAM – ‘HIGH’ VS. ‘PARTIAL’ COMPLIERS

6.1 Adherence rates

There were no significant differences between the experimental and control groups in adherence to the walking program. For the 32 people who completed the study, the average number of days walked out of a possible 40 was 33.56 (sd=7.04) and the average number of days walked for 30 minutes was 17.88 (sd=8.46). Fifty percent of those who completed the study recorded walking for 30 minutes on the required 20 days, 71.88% reported walking for 30 minutes on at least 15 days.

Due to the high rates of attrition and the variable levels of compliance with the walking program exploratory analyses were conducted on those who in the experimental and waiting list control groups who did comply with the walking program. Sixteen subjects (7 from Group E and 9 from Group C) reported high levels of compliance with the program. From their diaries, these subjects reported walking briskly for 30 minutes on at least 20 days (the amount prescribed by the walking regimen) and walking on at least 30 days out of a possible 40. This group have been labelled ‘high compliers’. The remaining 16 program completers, recorded brisk walking for a minimum of 15 days. However, walking for 30 minutes was recorded on 0-19 days for this group of ‘partial compliers’.

6.2 Characteristics of those who complied with the walking program

Compared to those who partially complied with the walking program, high compliers indicated significantly less body dissatisfaction at pre-test (BDDE-total; mean for partial compliers=40.25 (sd=11.25), mean for high compliers=30.25 (sd=14.98);
There were no significant differences between high and partial compliers at pre-test with regard to age, weight, social physique anxiety, depression, self-esteem, weight efficacy, physical self-efficacy, exercise beliefs or barriers to participation. High and partial compliers did not differ in their expectations that the program would improve fitness, psychological well-being, physical appearance or overall health status; the mean scores for each scale indicated expectations that the walking program would improve all aspects “to some extent”.

Half of those who fully complied with the program had child-onset overweight/obesity as did 43.8% of those who complied to a lesser extent.

### 6.3 PRE- TO POST- WALKING PROGRAM CHANGES FOR HIGH AND PARTIAL COMPLIERS

All variables were not automatically included in these analyses due to concerns of statistical power from the subject-to-variable ratio. Thus, only variables that had previously shown statistical changes were included in these analyses.

#### 6.3.1 Actual and perceived fitness

As can be seen in table 19, both the high and partial compliers improved in cardiovascular fitness over time (HR recovery (F(1,29)=4.28, p=0.05; HR max (F(1,29)=2.92, p=0.1). Perceived fitness also significantly improved over time in both groups (F(1,30)=37.8, p<0.001). No significant group by time interactions were observed.
**TABLE 18:** Comparing high and partial compliers on physical outcomes: Means, standard deviations and significance levels pre and post intervention

<table>
<thead>
<tr>
<th>Variable</th>
<th>Partial compliers (n=16)</th>
<th>High compliers (n=16)</th>
<th>Repeated measures ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>F</td>
</tr>
<tr>
<td>HR max</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>132.87 (13.92)</td>
<td>133.56 (15.76)</td>
<td>Group 0.10</td>
</tr>
<tr>
<td>Time 2</td>
<td>131.93 (17.64)</td>
<td>128.0 (12.79)</td>
<td>Time 2.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 1.48</td>
</tr>
<tr>
<td>HR 30 secs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>116.2 (15.11)</td>
<td>117.63 (17.15)</td>
<td>Group 0.07</td>
</tr>
<tr>
<td>Time 2</td>
<td>114.93 (18.40)</td>
<td>110.69 (13.15)</td>
<td>Time 4.28</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 2.04</td>
</tr>
<tr>
<td>Perceived fitness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>2.06 (1.88)</td>
<td>3.25 (1.91)</td>
<td>Group 3.31</td>
</tr>
<tr>
<td>Time 2</td>
<td>4.19 (1.72)</td>
<td>5.13 (2.03)</td>
<td>Time 37.83</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 0.15</td>
</tr>
<tr>
<td>Waist circumference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>98.22 (13.95)</td>
<td>94.88 (9.72)</td>
<td>Group 0.57</td>
</tr>
<tr>
<td>Time 2</td>
<td>95.93 (13.72)</td>
<td>92.91 (9.76)</td>
<td>Time 24.77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 0.28</td>
</tr>
<tr>
<td>Hip circumference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>123.38 (17.97)</td>
<td>115.56 (7.87)</td>
<td>Group 2.55</td>
</tr>
<tr>
<td>Time 2</td>
<td>122.13 (18.68)</td>
<td>113.80 (7.82)</td>
<td>Time 16.39</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G*T 0.44</td>
</tr>
</tbody>
</table>

### 6.3.2 Waist and hip circumferences

A significant main effect of time only, indicated that both groups’ waist and hip circumferences reduced over the course of the walking program (waist (F(1,30)=24.8, p<0.001; hip (F(1,30)=16.4, p<0.001).

### 6.3.3 Mood

Table 19 indicates a trend towards greater improvements in mood in those who complied more fully with the program (F(1,30)=2.4, p=0.1).

### 6.3.4 Body image variables

A trend towards a small improvement in overall body image satisfaction was observed for high program compliers, which was not evident in those who only
### TABLE 19: Comparing high and partial compliers on psychological outcomes: Means, standard deviations and significance levels pre and post intervention

<table>
<thead>
<tr>
<th>Variable</th>
<th>Partial compliers (n=16)</th>
<th>High compliers (n=16)</th>
<th>Repeated measures ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>F</td>
</tr>
<tr>
<td>BDI</td>
<td>Time 1</td>
<td>16.56 (12.18)</td>
<td>12.69 (7.38)</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>13.25 (10.16)</td>
<td>5.50 (3.37)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.40</td>
</tr>
<tr>
<td>SPAS</td>
<td>Time 1</td>
<td>49.0 (7.68)</td>
<td>46.81 (5.48)</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>45.88 (9.67)</td>
<td>44.19 (5.79)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td>BSS</td>
<td>Time 1</td>
<td>73.81 (9.01)</td>
<td>70.63 (9.69)</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>73.0 (9.36)</td>
<td>65.88 (11.96)</td>
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<td>2.43</td>
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<tr>
<td>BDD-item 2</td>
<td>Time 1</td>
<td>4.19 (1.80)</td>
<td>3.75 (1.73)</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>2.94 (1.48)</td>
<td>2.19 (1.28)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.22</td>
</tr>
<tr>
<td>WEL</td>
<td>Time 1</td>
<td>90.67 (32.03)</td>
<td>90.38 (39.46)</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>112.31 (34.97)</td>
<td>112.44 (35.86)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.09</td>
</tr>
<tr>
<td>RSE</td>
<td>Time 1</td>
<td>26.87 (6.40)</td>
<td>24.33 (4.50)</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>26.27 (5.13)</td>
<td>21.20 (4.07)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.19</td>
</tr>
<tr>
<td>PSE</td>
<td>Time 1</td>
<td>22.19 (4.49)</td>
<td>23.19 (6.40)</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>26.75 (6.21)</td>
<td>24.75 (7.88)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>3.27</td>
</tr>
<tr>
<td>Exercise  Beliefs</td>
<td>Time 1</td>
<td>10.81 (2.43)</td>
<td>10.27 (2.43)</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>9.63 (2.78)</td>
<td>10.38 (3.03)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.97</td>
</tr>
<tr>
<td>Barriers to Exercise</td>
<td>Time 1</td>
<td>29.73 (4.08)</td>
<td>32.38 (4.30)</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>33.93 (3.97)</td>
<td>34.44 (3.72)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.75</td>
</tr>
</tbody>
</table>

Higher scores indicate: greater dysphoria (BDI); greater social physique anxiety (SPAS); higher body dissatisfaction (BSS); more days thinking about body size/shape (BDE-item 2); greater self-efficacy for weight control (WEL); lower self-esteem (RSE), greater perceived physical ability (PSE); fewer positive beliefs about exercise and fewer perceived barriers to exercise participation.
partially complied ($F(1,30)= 2.43, p=0.1$). All those who completed the walking program reported post walking improvements on BDDE-item 2 ($F(1,30)=18.09, p<0.001$) and social physique anxiety ($F(1,30)=6.99, p=0.01$).

6.3.5 Weight Efficacy

A significant main effect of time on the WEL indicates that both high and partial compliers significantly improved on this measure ($F(1,30)=22.78, p<0.001$). No time by group interaction was observed (see table 19).

6.3.6 Physical self-efficacy and self-esteem

A group by time interaction on the Rosenberg self-esteem scale indicated that those who complied more fully with the program experienced significant improvements in global self-esteem, which remained unchanged in the partial compliers ($F(1,30)=5.19, p<0.05$). Physical self-efficacy significantly improved over time for all program completers ($F(1,30)=13.65, p<0.001$), although there was some indication that the partial compliers may have improved to a greater extent on this measure ($F(1,30)=3.27, p<0.1$).

6.3.7 Exercise beliefs and barriers to participation

A significant main effect of time, suggested that perceived barriers to exercise participation reduced over time, in both the high and partial compliers ($F(1,30)=17.59, p<0.001$). Beliefs about exercise did not change significantly from pre-post walking.
SECTION 7: QUALITATIVE DATA AND FOLLOW-UPS

7.1 Program completers

The 32 subjects (15 experimental and 17 control subjects) who completed the walking program were asked how much they had enjoyed the walking intervention. Over half (56.3%) said that they had enjoyed the program ‘very much’, and 40.6% reported ‘moderate’ enjoyment. One subject reported only ‘slight’ enjoyment.

Asked what they enjoyed most about the program, one subject reported “the discipline, fresh air and feeling of doing something positive”. Others reported “getting out of the house”, “having time to oneself”, “setting and maintaining targets” and “being able to do it at my own convenience” as aspects of the program they most enjoyed. Another subject reported “it has given me a sense of control and enabled me to control my eating. It has made me feel more positive that I can lose weight and be generally more fit”. Another, that the walking program had been a “great stress buster”.

Those who completed the walking program were asked what aspects they found most difficult. Finding the time featured most heavily for most subjects as did adverse weather conditions.

Only one of the 32 subjects who completed the walking program did not intend to carry on with brisk walking as exercise once the study was completed. Sixty three percent indicated that they would like to participate in other types of exercise, the most common being swimming (11 subjects).
Some of the reasons subjects gave for wanting to continue brisk walking as exercise are illustrated by the following comments: *I feel brighter, it helps with depression; I enjoyed it; I can do it on my own and don't have to wear special clothes; I had a happier disposition because of the walking, it was very positive; I enjoyed the walking and I feel if I can keep it up it will help tone me up; I never thought I could keep the walking program up and feel that now I have it would be a great shame not to continue.*

7.2 Reasons for attrition

Reasons for attrition were not known for four of the 22 subjects (group E and group C combined) who left the study during the walking phase. The two subjects in the waiting list control group who had completed a postal assessment at time 2 felt unable to start the walking program and left the study (one due to sciatica and one due to a bereavement). For the remaining subjects, the most commonly cited reason for dropping out of the walking phase of the study was finding the program too time-consuming (n=9). This reason was also given right at the start of the program when subjects were required to walk briskly for approximately 15 minutes per day. Seven subjects reported dropping out of the program due to health problems (unrelated to the exercise program).

7.3 Two month follow-up data

The 32 participants who completed the walking program were sent follow-up questionnaires to complete 2 months after the walking program had finished. There was an 81% return rate (n=26). Twenty of the respondents (76.9%) reported that they were continuing with the program. The average number of days they reported
walking per week was 3.4 and the average length of time was 20.8 minutes. There were no differences in the perception of fitness scores at follow-up in comparison to the previous testing session (means=4.64 (sd=1.71) and 4.68 (sd=1.73) respectively, t(24)=0.12, p>0.05).

The only measure of body image disturbance taken at follow-up was the number of days respondents’ had thought about their body size/shape over the past month and become upset as a result. There were no significant differences on this measure at follow-up compared to the previous testing point (means=2.36 (sd=1.32) and 2.44 (sd=1.19) respectively, t(24)=0.33, p>0.05). These scores correspond to thinking about and being upset by their body size/shape approximately once or twice a week over the past month.
CHAPTER 4

DISCUSSION

Following a summary of the main findings, this chapter will start with a discussion of the data collected from the respondents who answered the advertisement for 'overweight women, unhappy with the way their body looks'. Of particular interest is the impact of the age of onset of overweight/obesity on current body image dissatisfaction, and the utility of the negative verbal commentary model in explaining its development.

Following a discussion of the findings regarding habitual levels of exercise and body image in the baseline data, the main focus of the discussion will be on the impact of the brisk walking program on both physiological and psychological variables, for those who completed it. Limitations of the current research study will be discussed and directions for future research proposed. Finally, the clinical implications of the study are highlighted.

1. SUMMARY OF THE MAIN FINDINGS

1.1 Characteristics of the whole sample

The advertisements had generated a great deal of interest from women. Unfortunately, due to limited resources, only the first 350 people were distributed a questionnaire, of which 66% were returned completed.
Body image dissatisfaction was high amongst the respondents, with three quarters of the sample (76.1%) scoring above the cut-off for ‘negative body image’. Greater body image dissatisfaction was significantly associated with both lower self-esteem ($r=0.63$) and lower mood ($r=0.47$). The correlations between body mass index (BMI) and body image dissatisfaction and self-esteem were low ($r=0.29$, $r=0.17$ respectively). BMI did not correlate significantly with depression.

Those with child-onset overweight/obesity (onset at or before age 16 years) reported significantly greater current levels of body image dissatisfaction, lower self-esteem and were more overweight than those who became overweight after the age of 16. For those with child-onset overweight/obesity, the frequency of being teased as a child correlated significantly with current levels of body image dissatisfaction and self-esteem, even after controlling for weight. The frequency of teasing over the past year was also significantly correlated with higher current levels of body image dissatisfaction and lower self-esteem, irrespective of age of onset of overweight/obesity.

Habitual exercise levels amongst the initial sample of respondents were low. For most respondents, ‘mild’ activities such as walking were reported twice a week, on average. One in five subjects reported infrequent participation in more ‘strenuous’ types of activity such as aerobics, swimming and the gym. A cross-sectional analysis of habitual levels of exercise indicated little differences between respondents’ classified as inactive, low-active, moderate-active and high-active on measures of body image dissatisfaction or self-esteem. Those who were less active, perceived greater barriers to exercise participation than those who were more active.
1.2 The walking program

Attrition was high in the exercise phase of the study (35%-46%). Those who completed the first exercise phase (n=15) indicated significantly greater improvements in cardiovascular fitness, perceived fitness, mood, physical self-efficacy and efficacy for weight control in comparison to the waiting-list control group. No significant changes in weight were observed, although small reductions in waist and hip measurements in the experimental group were recorded pre-post exercise. These findings were replicated when the waiting-list control group were crossed-over to the exercise condition.

Overall body dissatisfaction, days pre-occupied with body size or shape concerns and social physique anxiety decreased over time in both groups during the experimental phase of the study, while behavioural avoidance and physical appearance state-anxiety remained unchanged. Further improvements in overall body satisfaction were observed when the control group were crossed-over to the exercise condition together with a trend towards reductions in social physique anxiety. Days pre-occupied with body size/shape, behavioural avoidance and physical appearance state-anxiety remained unchanged during this second phase of the study.

Comparison of those who reported stricter adherence to the walking protocol with those who only partially complied with the program, indicated trends towards greater improvements in mood, overall body satisfaction and significant improvements in global self-esteem for those who complied more fully.

At two month follow-up, 62.5% of those who completed the walking program reported continuing a modified exercise protocol. Perceived fitness and days thinking about body size/shape remained similar to post-test measures.
2. FINDINGS IN RELATION TO THE STUDY AIMS

2.1 Level of obesity and psychological disturbance

Over three quarters of the respondents who returned the postal questionnaire were classified as obese from their self-reported weight and height. While it is possible that subjects under or over-reported their body size, the correlation between self-reported BMI and actual BMI for those who were assessed was high (r=0.97) indicating that estimated BMI from self-reports is likely to be quite reliable.

The baseline scores on the Beck Depression Inventory and the Rosenberg Self-Esteem Scale provide little evidence of increased rates of psychopathology in the sample as a whole, adding to the increasing number of studies showing few differences between overweight and average weight samples (e.g. Sarwer et al., 1998; Wadden et al., 1991).

As was expected, body image dissatisfaction amongst the sample was high. Three quarters of the sample (76.1%) scored above the cut-off for 'negative body image' (Rosen & Reiter, 1994). However, the term Body Dysmorphic Disorder (BDD; APA, 1994) cannot be applied to the women in this sample since the 'defect' in appearance is real and not imagined.

The failure to find a relationship between BMI and depression, the weak relationship between BMI and self-esteem (r=0.17), and the low correlation between BMI and body image dissatisfaction (r=0.29) supports other studies that being overweight per se is not a singular determinant of related emotional disturbance or body image dissatisfaction (e.g. Davis et al., 1994; Rosen et al., 1995; Sarwer et al., 1998).
Previous studies have suggested that psychopathology is related to the level of stigmatisation that individuals experience. Studies have shown that overweight individuals are discriminated against in both the work and social environments, receiving fewer job offers and lower salaries than their ‘normal’ weight counterparts (Klesges et al., 1990; Frieze et al., 1990) and also being less likely to marry (Gormaker et al., 1993). The lack of a ‘normal’ weight comparison group in the current study prevents conclusions to be made about occupational and marital status. The majority of the respondents reported intermediate status occupations, crudely relating to middle-class socio-economic status, and over half were married. Marital rates were similar to those reported by Sarwer et al.’s (1998) sample of obese treatment seeking women and no different to their control sample of nonobese, non-treatment seekers. One of the most striking findings regarding stigmatisation, however, was the frequency of weight-related teasing reported by respondents over the past year. By far the majority of respondents (85%) reported that they had recently been teased about their weight and shape, the most common form of which had been others making jokes about their weight/shape. The relationship between teasing, body image dissatisfaction and self-esteem will be discussed in detail later.

2.2 Relationship between body image dissatisfaction, self-esteem and mood

Higher levels of body image dissatisfaction were significantly associated with greater dysphoria and lower self-esteem. While a number of studies have reported a relationship between body image dissatisfaction and mood (e.g. Foster et al., 1997; Sarwer et al., 1998), the findings regarding the relationship between body image dissatisfaction and self esteem have been less consistent. For example, Grilo et al. (1994) reported that body image dissatisfaction and self-esteem were not
It was hypothesised that the relationship between body image dissatisfaction and self-esteem would be stronger in those individuals who viewed physical appearance as an important aspect of their self-evaluation. Although those who felt that appearance was of least moderate importance as a means of self-evaluation were significantly lower in self-esteem than those who reported physical appearance was of no or little importance to their self-evaluation, there were no significant differences between the correlations of body image dissatisfaction and self-esteem in these two groups. The failure to find a significant difference between the correlations may have been related to the very few number of women (n=10) who did not consider physical appearance to be of any importance to their self-evaluation and requires replication.

2.3 Age of onset of overweight/obesity, teasing history and body image dissatisfaction

As was expected, childhood onset overweight/obesity in this sample was associated with greater body image dissatisfaction than was evident for those who reported first being overweight after the age of 16 years. For those with early-onset overweight/obesity, the frequency of reports of teasing during childhood were positively correlated with current body image dissatisfaction, and lower self esteem even after controlling for current weight. Conversely, those with early-onset overweight/obesity who reported never having been teased as children, reported significantly
greater body image satisfaction and higher self-esteem than those who reported being teased during their childhood. Although these respondents were also currently less overweight and had never been as heavy as those who had been teased as children, the weak correlation between actual weight and body image dissatisfaction suggests that this would account for little of the variation.

Before speculating as to the relationship between weight/teasing history and current levels of body image dissatisfaction and self-esteem, certain methodological limitations need to be considered. Neither the age at which subjects became 'overweight' nor the frequency of teasing were able to be corroborated by sources of information other than self-report. The difficulties of relying on self-reports of weight and teasing history are evident from the finding that almost a quarter of those who reported adult onset overweight/obesity (which was actually onset after the age of 25 years) also reported that they had been teased about their weight or shape during childhood. Thus the reliability of these data are questionable. Grilo et al. (1994) reported similar findings, again without external verification of teasing frequency and suggested the possibility that current levels of body image dissatisfaction may produce a retrospective recall bias about appearance relevant information, in this instance, weight-related teasing. However, in this sample, even those who reported never having been teased as children reported high levels of body image dissatisfaction which, from an information processing theory perspective, should have been equally likely to have resulted in selective memory for weight related experiences. Thus these findings provide further support for the negative verbal commentary model, which suggests that the frequency of being teased about
one’s weight/shape whilst growing up is associated with a greater degree of body image concerns during adulthood.

However, regardless of the age of onset of overweight/obesity, the frequency of teasing over the past year was also significantly correlated with greater body image concerns and lower self-esteem, suggesting that the impact of teasing on body image dissatisfaction may not be confined to childhood teasing experiences. The negative verbal commentary model proposes that teasing during childhood, the period when the body image construct develops (Offman & Bradley, 1992), is likely to be particularly damaging to the development of a positive body image. Although the relationship between recent teasing experiences and body image dissatisfaction is correlational, preventing inferences about causality, it is possible that more recent teasing experiences may be as damaging to body image dissatisfaction and self-esteem through a recency effect. Future studies seeking objective verification of when an individual became overweight, teasing at different developmental periods (childhood, adolescence and adulthood), as well as prospective studies will help to clarify the role of teasing in the development of body image dissatisfaction and self-esteem.

2.4 Beliefs and attitudes towards exercise

Some of the teasing experiences the respondents reported were in relation to physical activity. Thirty eight percent of respondents reported that they had been laughed at for trying out sports as recently as the last year. For those who had been overweight/obese as children, 70% recalled being teased when trying out sports in their youth. Therefore, Garner and Wooley’s (1991) assertion that being fat may
deter people from exercising through shame and fear of ridicule gained some support in the current study. The majority of the sample (63%) felt that they were "too fat" to exercise which while for some may have been related to a belief about not being healthy enough to exercise (24% thought that their health was not good enough), for others may relate to low confidence in exercise situations. The majority of the sample (72%) disagreed with the view of themselves as being good at sport and the majority (55%) did not like wearing work out clothing. Self-efficacy for exercise was low in over half of the sample who felt that they would never be able to keep it up (58%).

2.5 Current levels of physical activity and body image dissatisfaction

The cross-sectional analyses of physical activity levels indicated low exercise rates across the sample. The most frequent type of activity reported was walking. Half of the sample reported participating in 'moderate' activity, on average, less than once per week with only twenty percent of respondents reporting participation in occasional 'strenuous' types of activity such as the gym, aerobics, cycling or swimming. These findings are likely to be an overestimate of current activity levels, since self-reports of exercise participation tend to be inflated (Lichtman et al., 1992).

The finding that more frequent physical activity was not associated with greater body image satisfaction in this sample, does not replicate earlier cross-sectional studies which have shown even moderately active, average weight, women are more satisfied with their appearance than those who are inactive (e.g. Loland, 1998). It is possible that the failure to find any association between current activity levels and
body image satisfaction in this sample may have been due to a floor effect of low exercise uptake. Unlike most cross-sectional studies investigating the relationship between body image satisfaction and exercise, none of the respondents were selected on the basis of high initial levels of activity. Further, from the literature which has suggested that exercisers have a more positive body image than non-exercisers, it is likely that those responding to advertisements for people who were ‘unhappy with the way their bodies look’, by definition, would also be less likely to be exercising.

THE IMPACT OF THE EXERCISE PROGRAM

2.6 Group assignment and attrition

Subjects assigned to the experimental and waiting-list control groups were similar at pre-treatment on all outcome variables, and fairly representative of the initial pool of respondents. Control and experimental subjects did differ, however, on the age of onset of overweight/obesity. A greater proportion of the control group than the experimental group reported child-onset obesity, although no significant group differences in body image dissatisfaction or self-esteem were reported as a consequence. Since there were no significant differences in the proportions of child or adult onset overweight/obesity for those who completed the walking program, any potential confounding effects of the age of onset of overweight/obesity would have been equally distributed across subjects during the exercise phase.

Despite the use of a walking program as the exercise intervention, presumed to have higher rates of compliance than other more demanding types of exercise, attrition was a significant problem in the current study. Forty six percent of the experimental group and 35% of the controls when they were crossed over to the walking phase of
the study, dropped out. The most common reason for dropping out of the exercise phase was finding the program too time consuming (41%). Approximately one third reported having to stop the program for health reasons and one respondent, because of a family bereavement. Reasons for attrition were not known for four of the subjects. Factors which may have contributed to drop-out will be discussed in a later section.

The high rates of attrition mean that the following findings need to be viewed with caution, as they only apply to those who completed the walking program.

2.7 Cardiovascular and physical health variables

The 8 week brisk walking program was sufficient to produce a cardiovascular training effect. As predicted, the walking program did not result in weight loss. Both perceived fitness and actual fitness improved in the experimental group whilst remaining unchanged in the waiting-list control group during the first phase of the study. When group C completed the walking phase, a trend towards cardiovascular fitness was observed, weight remained similar and perceived fitness significantly improved. Since subjects started at different rates of fitness, it is possible that changes in aerobic capacity for some subjects take a longer time than for others (Bouchard, 1995; King et al., 1995; Snyder et al., 1997).

There was some indication of a change in waist and hip girth for those who completed the walking program, with small but significant reductions in both waist and hip measurements observed in the experimental group, relative to the control group. It seems unlikely that these reductions were as a result of dietary restriction.
since these changes were not associated with weight loss. Although half of the control group reported calorie restriction during the waiting period phase compared to only one of the experimental group subjects, the lack of corresponding weight loss may indicate that ‘calorie restriction’ may mean ‘normal’ eating patterns for these subjects (the majority of the sample reported dieting over the past year). Significant reductions in waist and hip measurements were also observed for the control group during the walking phase of the study, which again were not associated with significant weight loss. It is unfortunate that the equipment to analyse percentage body fat failed, since this would have enabled more objective verification of any changes in body composition as a result of the exercise.

Diastolic blood pressure reduced significantly over time for both the experimental and waiting list control groups. It is possible that blood pressure may have been elevated at the initial assessment when subjects did not know what to expect and that lower blood pressure at the second testing point was due to reduced anxiety. The reductions in systolic blood pressure observed in the control group, while remaining unchanged in the experimental group are difficult to explain. Obvious improvements in blood pressure were enquired about in two of the control subjects during their second assessment. One attributed improvements to having been on holiday during the waiting period and the other, to cutting her number of working days. Variables such as these were not routinely assessed and may have contributed to the improvements in blood pressure observed in the waiting list control group relative to the experimental group.
It was an unexpected finding that the walking program itself did not influence blood pressure. Although hypertension was not an exclusion criteria for the study, two GP's refused to give consent to their patients' participation due to high blood pressure and therefore only subjects with blood pressure in the 'normal range' may have been inadvertently selected, creating a potential ceiling effect. Alternatively, the walking program may have been too short or not intensive enough to confer benefits on blood pressure. Palmer (1995) only reported improvements in diastolic blood pressure in her 8 week walking program, while systolic blood pressure remained unchanged.

2.8 Impact of completing the walking program on mood, physical self-efficacy and self esteem

At the conclusion of the 8 week brisk walking program, the experimental group showed significantly greater improvements in mood relative to the waiting list control group. Improvements in mood were replicated when the control group undertook the walking program, despite only small improvements in cardiovascular fitness. These results replicate those of Brown et al. (1995) who reported improvements in mood with a moderate intensity walking program over 16 weeks. However, other studies of brisk walking over similar time periods to this study (6-8 weeks) have failed to find resultant improvements in mood (Cramer et al., 1991; Palmer, 1995). Both studies attributed the failure to find improvements in mood to be due to the 'psychologically healthy' profile of their subjects at pre-treatment.

Here, the significant improvements in both physical self-efficacy and perceived fitness for those who completed the walking program, suggest that mastery
experiences may be one of the important variables linking exercise to improved mood. Feelings of accomplishment and competence at completing an exercise program may have been particularly important for these subjects, bearing in mind their previous negative sporting experiences. The majority of those who completed the study reported that they had enjoyed the walking intervention and the feeling of ‘doing something positive’. As one woman commented, “I never thought I could keep up the walking program and feel now that I have it would be a great shame not to continue”.

It should be noted that the post program psychological measures were completed before physical measures and therefore improvements in mood were not based on knowing about the physical improvements they had made.

It is interesting to note that improvements in mood occurred even when these women exercised on their own. Earlier studies have suggested that the social aspects of exercise participation may be more important than the exercise itself in improving mood (e.g. Gillett, 1988; Hughes et al., 1986). An improvement in the study design to include a comparison ‘group exercise’ condition would have enabled further exploration as to whether the social aspect of exercise results in greater improvements in mood.

Given the sense of achievement that was reported by those who completed the program, it is a little surprising that no significant improvements in global self-esteem were observed in the experimental phase of the study. The significant improvements in global self-esteem in the controls who completed the walking phase
are interesting, and may be attributable to a sense of accomplishment at having adhered with the study protocol for longer (i.e. over 16 weeks). However, this finding needs to be viewed with caution due to the lack of a non-treatment comparison group during the second phase of the study, and the inability to attribute improvements in self-esteem to exercise per se. Brown et al. (1995) also found improvements in global self-esteem over 16 weeks for subjects assigned to exercise conditions and a non-treatment control group.

The consistent improvements in physical self-efficacy, following the exercise phase, rather than global self-esteem provides support for the multidimensional model of self-esteem (Sonstroem & Morgan, 1989), that exercise participation influences a lower order construct of self-esteem (beliefs and convictions that one can perform an activity) more so than general feelings of self-worth.

2.9 Body image dissatisfaction

Contrary to expectations, there were no significant treatment effects for any of the measures of body image dissatisfaction in this preliminary investigation of exercise in the treatment of body image disturbances in overweight women. The failure to find a significant treatment effect of exercise on body image satisfaction is in contrast to studies using ‘normal weight’ samples (e.g. Fisher & Thompson, 1994).

Both groups improved during the first phase of the study on measures of overall body image satisfaction, social physique anxiety (a trait measure of body anxiety) and a cognitive aspect of body image (the number of days thinking about and being upset about body size/shape). During the second phase, when the control group
completed the walking program, further significant improvements in overall body image satisfaction were observed. A trend towards improvement was observed for social physique anxiety while no changes were observed on the cognitive aspect of body image.

The finding that both groups improved over time on these variables could be explained in a number of ways. It may be that individuals responding to the advertisement were feeling at their worst, or may even have 'exaggerated' their body image dissatisfaction to ensure their inclusion in the study, thus producing 'elevated' body image dissatisfaction scores at the start of the study. By the time of the second assessment, subjects may have moved closer to their 'true' level of body image dissatisfaction. However, the further improvements observed when the control group completed the walking phase, while not ruling out this hypothesis, suggests that there may be something about completing the study that is important, at least in addition to the above.

The assessment procedure itself may have been enough to induce the significant improvements in body image satisfaction for these women. At the mention of a fitness test, most of the women were anxious at their ability to complete it. It is possible, therefore, that the mere completion of the fitness test at the first assessment may have resulted in greater confidence in their physical ability and reduced body image dissatisfaction. Equally, there may have been some other aspect of the assessment procedure that had an impact on body image dissatisfaction e.g. interest and attention from a friendly researcher. Alternatively, 'normalising' overweight or seeing oneself as not being as overweight as others may have induced improvements
in overall body satisfaction. Subjects knew that many people had been interested in taking part in the study and some had even seen others waiting for an appointment.

Neither the state measure of body image anxiety (PASAS) nor the measure of behavioural avoidance changed in the experimental phase of the study. These non-significant findings were replicated when the control group crossed-over to the exercise condition. The state body image anxiety measure was completed while subjects were imagining themselves in a high exposure situation (walking along a crowded beach in a swimming costume). This was the same measure as was used by Fisher & Thompson (1994), when they reported only a trend towards improvement with their exercise intervention. The failure to find any change on the behavioural avoidance measure also replicates the findings of Fisher and Thompson (1994). Studies that have found a positive CBT effect for decreasing behavioural avoidance (e.g. Rosen et al., 1990) have used in-vivo exposure techniques as part of their treatment package. In this exercise intervention, the exposure element was very small as subjects were not required to walk with others or expose any part of their body to undertake the walking program. One subject reported going to great lengths to avoid exposing her body, when she would only go out walking when it was dark. An exercise condition emphasising body exposure may therefore be more beneficial in improving these aspects of body anxiety and behavioural avoidance.

Body image satisfaction may not improve through exercise in women who are objectively overweight, without a resultant change in body dimensions (Collingwood & Willett, 1971). Although we have not seen a convincing relationship between weight and body image dissatisfaction, these women may have remained dissatisfied.
because they expected to lose weight through exercise and did not. Although the study by Foster, Wadden and Stunkard (1997) found that improvements in body image satisfaction did not correlate with weight loss, some weight loss did occur. Therefore, decreases in weight, even if only small, may be necessary for women to start feeling better about their bodies.

The program itself may not have been ‘intense’ enough to produce the changes in body image satisfaction which have been observed with ‘normal’ weight samples. In their study, Fisher and Thompson (1994) reported improvements in body anxiety and body satisfaction with aerobics and weight lifting alongside body image education, in comparison to a control group. Unfortunately, Fisher and Thompson (1994) did not collect any anthropomorphic data which may have contributed to our understanding of whether the improvements in body image satisfaction were associated with any changes in weight or physical fitness.

It is interesting to note that, given the relationship between mood and body image dissatisfaction, the improvements in mood observed for those who completed the walking program did not correspond with improvements in body satisfaction. Stunkard and Mendelson (1961) had assumed that mood influenced levels of body image disturbance, however the results from this study suggests the relationship between mood and body image dissatisfaction may be mediated by some other variable, or variables, since improvements in mood did not necessarily lead to improvements body image satisfaction and similarly an improvement in body image dissatisfaction was not necessary for an improvement in mood.
2.10  Improved self-efficacy for weight control

Participating in the exercise program lead to significant improvements in efficacy for weight control in both the experimental group and the control group in the cross-over phase. These findings support those of other non-dieting treatments which have found incidental improvements in self-reported eating habits despite not being specifically addressed in treatment. The weight efficacy lifestyle questionnaire (WEL) assesses how confident an individual feels that she could resist eating in a variety of situations. Although significant improvements in all sub-scales of the WEL were observed over time, the two sub-scales which showed the greater improvements for the experimental group relative to the waiting list controls were negative emotion and physical discomfort, indicating that exercise may reduce stress-related eating in particular. The improvement in mood may be responsible for improved confidence in the ability to resist eating in situations relating to negative emotion, although we cannot be sure that greater confidence in the ability to resist eating is not what has lead to an improvement in mood.

Although the weight efficacy lifestyle questionnaire only asks subjects what they think they would do in certain situations, self-efficacy theory suggests that this is an important indicator of their actual behaviour in similar situations since individuals with high efficacy expectations are more likely to cope with high risk situations (Abrams & Niaura, 1987; Marlatt & Gordon, 1985). This finding may shed new light on the relationship between exercise and the maintenance of weight loss. While one hypothesis has been that exercise maintains weight loss through energy expenditure, another could be that exercise is associated with improved mood and a subsequent reduction in the amount of overeating, at least in situations pertaining to
mood. This hypothesis is only speculative at this point and requires further investigation.

2.11 Are improvements related to the degree of program compliance?

Program adherence was evaluated from self-report information collected from diaries the respondents kept during the walking phase and indicated that 50% of those in both groups (experimental and control) who completed the walking program had adhered to program instructions, walking briskly in the required range (on average, 60-65% of heart rate maximum) for 30 minutes per day on the required number of days.

Those who reported greater compliance with the program instructions, indicated significantly lower body image dissatisfaction at pre-test than those who complied with the walking program to a lesser extent. 'High' compliers showed trends towards greater improvements in mood and overall body image satisfaction and significant improvements in global self-esteem compared to those who showed less adherence to the program instructions. Improvements in global self-esteem for the high compliers may indicate a greater sense of mastery and accomplishment at being able to attain the program goals, although this is only speculative and may have been the result of a type I error. The unexpected trend towards greater improvement in physical self-efficacy for the 'partial' compliers, indicates that greater adherence to the program instructions was not necessary for improvements in perceptions of physical ability.
The improvements in mood, overall body image satisfaction and global self-esteem for high compliers were not associated with any greater improvements in actual or perceived fitness, further indicating that improvements in psychological variables are not dependent on changes in physical measures.

It may be, of course, that the high compliers over-reported their adherence to the program to 'please the examiner'. The trend towards greater improvements on psychological measures may also be attributable to increased social desirability in this sub-group, although if this were the case, it is a little surprising that improvements were not observed on more of the dependent variables.

Although these differences between 'high' and 'partial' compliers are of interest, the comparisons need to be viewed with caution since subjects were no longer randomised, and there was no longer a non-treatment control.

2.12 Factors contributing to drop out

Contrary to expectations, social physique anxiety predicted neither exercise uptake in the cross-sectional analyses of pre-treatment levels of activity nor attrition/adherence during the exercise intervention. It may be that the exercise intervention chosen in this study was not particularly anxiety provoking since subjects did not need to wear 'special' clothes or exercise with others. Thus, social physique anxiety may not be as important in predicting exercise participation here as in other more socially evaluative settings such as aerobics classes. Further evidence that the exercise intervention chosen for this study was not particularly anxiety provoking comes from the failure to find any significant improvements on the social physique
anxiety scale following completion of the walking program. Those subjects who remained in the study were just as anxious about their physiques at the end of the walking program as they had been pre-treatment. Reasons for dropping out of the walking program were therefore not related to social physique anxiety.

Those who remained in the experimental group had higher expectations that the walking program would improve their physical appearance, psychological well-being and overall health status than those who dropped out. These findings support other studies that have shown those who strongly value exercise and expect health benefits from exercise are more likely to engage in physical activity (Dishman, 1988). However, these findings were not replicated in phase two of the study when the control group were assigned the exercise condition. Here, program expectations did not differentiate drop-outs from completers for those who had to wait for 8 weeks to take part in the exercise phase.

Self-efficacy theory would predict that increasing expectations regarding the benefits of exercise would be likely to improve program adherence. Those who expect the most gains from exercise are more likely to persevere in overcoming barriers to exercise participation, the most common being a lack of time (Owen & Bauman, 1992). It is interesting to note that while there were no differences between those who completed the walking program and those who dropped out regarding the beliefs about exercise or perceived barriers to participation, both of these variables significantly improved over time during the experimental phase of the study.

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1 Expectations about the benefits of the walking program were assessed immediately prior to the walking intervention.
regardless of group membership. In other words, merely agreeing to take part in an exercise program improved attitudes towards exercise.

3. LIMITATIONS

3.1 Sample size and attrition

The main limitation of this preliminary investigation into walking is the high rates of attrition, limiting interpretation of the results to being valid only for those who completed the program. Although from the measures taken, drop-outs did not appear to be a dramatically different group, it is possible that those who stayed in the study were the ones most likely to benefit from an exercise program and the ones most likely to report psychological improvements or respond in a socially appropriate manner.

The use of an intention-to-treat analysis, assuming that those who dropped out of the program would not have changed on any of the outcome measures, would have enabled greater certainty as to the impact of the intervention. However, this analysis did not seem appropriate for the exploratory nature of the study.

The failure to find significant improvements in body image satisfaction for the treatment over the control condition may be related to the small number of subjects remaining in the study and hence reduced power to find statistical differences between groups. Equally, however, the number of statistical analyses that have been conducted with the small numbers completing the program, may have resulted in type I errors and results should therefore be viewed as exploratory and cautionary.
The failure to recruit more subjects to the experimental phase of the study was due to

time resources, rather than a difficulty in obtaining subjects.

3.2 Adherence

Poor compliance may have diluted the strength of the treatment and resulted in the

failure to produce significant improvements in body image satisfaction. Although

improvements in cardiovascular fitness indicate that subjects who remained in the

study complied with the program at least to some extent, adherence would have been

assessed more accurately with external verification rather than relying solely on self-

report data. Pedometers were used to verify the distance walked for approximately

half of the sample who completed the program and indicated that for those who used

them, the distance covered was that which would be expected for brisk walking over

half an hour. However, subjects were still required to document the distances

walked and accuracy of recording was unable to be corroborated. Closer monitoring

of the walking program through subjects presenting to a particular location for

exercise, was not possible in the current study due to time constraints. However,
even if this had been possible, previous studies have suggested rates of compliance

may have been further compromised (Perri et al., 1997). Similarly, it was not

possible to be certain of the control group’s level of inactivity, although failure to

find significant improvements of fitness and self-report data suggest that they were

significantly less active than the experimental group.

3.3 The intervention

The exercise intervention prescribed may not have been of adequate intensity or
duration to influence body image satisfaction. Other researchers have suggested that
while moderate intensity exercise may result in the same improvements as more vigorous exercise, it may take longer for the positive effects to manifest (Wood, Terry & Haskell, 1995).

Similarly, the choice of exercise intervention in this study may not have lead to the most optimum results. Strength training has been shown to result in greater improvements in body satisfaction than aerobic training, possibly due to more noticeable physical changes associated with weight training and/ or the increased sense of mastery and achievement through being able to lift increasingly heavy weights (Tucker & Mortell, 1993). More research is needed to look at the type of exercise that would be most beneficial to overweight and obese women, as well as what would be acceptable in terms of uptake and compliance; very few of the women in the wider survey of respondents reported that they used the gym.

Another question would be whether the subjects needed to have exercise in a group for benefits in body image satisfaction to have occurred. Exercising in a group affords opportunities for group support from peers as well as reinforcing feedback from a group leader (Dishman, 1991; King, 1994). Although group exercise was not necessary to incur the improvements observed for mood, social reinforcement and exposure to others may be necessary to induce changes in body image satisfaction, not least behavioural avoidance, which was an important characteristic of the sample in this study.

The study design would also have been improved if pre- and post- assessments could have been administered blind by the researcher, to minimise experimenter bias. This
was not possible in the current study due to limited resources. The extent to which this would ever be possible, however, is questionable since the women who took part in the study were often keen to talk about their experiences of the exercise program.

3.4 Outcome measures

The face validity of the scales together with subjects' knowledge that the study was concerned with 'health and well-being in overweight women' may have resulted in improvements in mood, physical efficacy and eating efficacy through demand characteristics. Schwarz (1999) has reminded researchers that we are often not fully aware of the information that our questionnaires or our experimental procedures provide, and therefore may miss the extent to which the questions we ask, determine the answers we receive.

Improvements in body image satisfaction over time may also have been an artefact of measurement. Test-retest reliability information was only available for the body image avoidance questionnaire, which was one of the only scales to consistently show no change over time or treatment in the current study. Therefore it is quite possible that improvements over time observed on the body dissatisfaction scales may have been due to measurement error.

Due to the multidimensional nature of body image, a variety of measures were used to assess the attitudinal, cognitive and behavioural aspects of body image satisfaction, with a large degree of overlap between them (Stormer & Thompson, 1996). Recently, "feeling fat" has been shown to be of considerably more importance to body image dissatisfaction than "thinking fat", or perceiving oneself
to be overweight. Tiggemann (1996) has suggested that while any one measure of body image dissatisfaction is likely to contain both components (i.e. thinking and feeling fat), the ratio of contribution is unknown. Feeling fat is predicted by dietary restraint, self-esteem and depressed affect, with women generally feeling fatter than they think they are (Tiggemann, 1996). No direct measurement of "feeling fat" was administered in this study yet, given the improvements observed for both mood and eating efficacy, might be the aspect of body image most likely to improve.

Finally, in hindsight, an omission in the study design was the failure to utilise the self-report version of Body Dysmorphia Disorder Examination (BDDE-SR) as an outcome measurement. Few measures of body image dissatisfaction have been developed for use with obese samples, who may often score at ceiling on scales developed for those of average weight. The BDDE-SR appeared to capture very well the high levels of body image disturbance characteristic of the sample. It is unfortunate not to have been able to explore any changes on this measure of body image disturbance.

3.5 Follow-up

If we assume that the six respondents who failed to complete follow-up information had discontinued with the program, then 63% of those who completed the study reporting continuing brisk walking to some degree at two month follow-up. Unfortunately, follow-up data did not include information on mood, physical self-efficacy, self-esteem or eating efficacy leaving us unclear as to whether improvements were maintained. No statistical changes were observed in either perceived fitness or the singular measure of body image (number of days pre-
occupied with body size/shape) from the post-program assessment, indicating some maintenance over 2 months. Sample size considerations preclude the analysis of any differences in these variables by the degree to which exercise levels had been maintained. Longer term follow-ups with a greater number of subjects would be useful to monitor adherence as well as the longer term impact on health, well-being and body image satisfaction for those who continue with exercise.

### 3.6 Generalisability of findings

The findings from this study may be of limited generalisability. Since the advert asked for women who were unhappy with the way their body looks, they cannot be expected to generalise to all obese women, many of whom have been found to be satisfied with their body image (e.g. Faubel, 1987). Several studies have found that obese individuals presenting for treatment report greater emotional disturbance than those who do not e.g. greater binge eating and greater depression (Fitzgibbon, Stolley & Kirschenbaum, 1993; Prather & Williamson, 1988).

Moreover, the characteristics of the subjects (predominantly white, middle-income) limit generalisability, particularly since obesity is more often associated with lower socio-economic groups (Goldblatt et al., 1965). Ninety six percent of the sample of subjects recruited to the experimental phase of the study were white, the remaining 4% (2 subjects) were Afro-Carribean. Since ethnicity was not assessed in the whole sample, cultural differences in body image dissatisfaction were unable to be explored and generalisability of these findings to the general obese female population is further compromised.
The use of an exclusively female sample, prohibits the knowledge of how men may have responded to such a program. The issues facing overweight men with respect to body image dissatisfaction would be an interesting area to explore.

DIRECTIONS FOR FUTURE RESEARCH

A research design using a more ‘powerful’ exercise condition would be helpful to try and replicate the improvements in body image satisfaction that have been observed through exercise using ‘normal’ weight samples. Particular consideration needs to be given to ways of improving adherence with exercise programmes as it is likely that as the exercise component becomes more demanding, compliance is likely to be further compromised.

Further understanding of the development of body image dissatisfaction in those who are overweight and obese is also required. The negative verbal commentary model explored in the current study, clearly does not account for all of the variation in body image dissatisfaction. Other models (e.g. social comparison; sociocultural) may more adequately explain the development of body image dissatisfaction in some overweight women, although they have so far only been tested using non-overweight samples. Furthermore, coping with obesity-related stigma is an area which has received little attention in the literature. Research with obese individuals who are satisfied with their bodies would yield much valuable information.
CLINICAL IMPLICATIONS OF THE CURRENT STUDY & CONCLUDING REMARKS

In support of Thompson (1992), the high rates of body image dissatisfaction/ negative body image in the whole sample of respondents, underscores the need for a new diagnostic category of body image disturbance to include those who are objectively overweight or obese. Once identified, body image dissatisfaction clearly needs to be addressed as part of the programmes offered to those seeking treatment for their obesity, since weight loss alone will not necessarily improve how women view their bodies.

In this study, although significant improvements in body image satisfaction were not observed, a moderate intensity walking program has resulted in significant improvements in cardiovascular fitness, mood, physical self-efficacy and eating efficacy for the overweight women who completed it. The health benefits of increasing levels of physical activity, while not fully assessed in the current study, are likely to be significant if activity levels can be maintained (Morris & Hardman, 1997). Thus, if the health risks associated with obesity can be reduced through factors other than weight loss, it may be more prudent to focus on lifestyle rather than obesity where treatment compliance and long-term weight reductions have been so poor (Garner & Wooley, 1991). Encouraging women to incorporate even moderate intensity exercise into their daily routines, may be an important component of the 'new paradigm' treatments for obesity, which have recently reported impressive results. As Lyons (1989) so eloquently notes, exercise may help obese women to learn that their bodies can move with grace and power, and provide an opportunity to unlearn the lies that the world has embedded on them – that their bodies are ugly, clumsy and should remain hidden.
References


References


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143
References


Frieze, I.H., Olson, J.E. & Good, D.C. (1990). Perceived and actual discrimination in
References


References


Heinberg, L.J. & Thompson, J.K. (1992b). The effects of figure size feedback (positive vs. negative) and target comparison (particularistic vs. universalistic) on body image disturbance. International Journal of Eating Disorders, 12, 441-448.


References


References


References


APPENDIX A
Ms Carolyn Edwards  
Clinical Psychologist in Training  
Sub-Department of Clinical Health Psychology  
UCL  
Gower Street  

16 March 1998

Dear Ms Edwards

Study No: 98/0017 (Please quote in all correspondence)  
Title: Examining the effectiveness of exercise in improving body image satisfaction in obesity

Thank you very much for your letter of the 5th March supplying further information requested by the Ethics Committee. The above proposal is now agreed and you may go ahead with your study.

Please note that it is important that you notify the Committee of any adverse events or changes (name of investigator etc) relating to this project. You should also notify the Committee on completion of the project, or indeed if the project is abandoned. Please remember to quote the above number in any correspondence.

Yours sincerely

Professor André McLean  
Chairman
APPENDIX B
ACN helps the Catholic Church wherever she is persecuted. Please remember those who will suffer for their Faith.

Aid to the Church in Need
1 Times Square, Sutton, Surrey SM1 1LF.
Tel: 0181 642 8668.
Reg. Charity 265382

Charities

How far would you go to church? ...

... to prison?

ACN helps the Catholic Church wherever she is persecuted.

Please remember those who will suffer for their Faith.

Aid to the Church in Need
1 Times Square, Sutton, Surrey SM1 1LF.
Tel: 0181 642 8668.
Reg. Charity 265382
Dear

Thank you for contacting us about the study we are carrying out at University College London on the health and well-being of overweight women.

At this stage, I would be very grateful if you could complete the enclosed questionnaire and return it to us in the FREEPOST envelope provided as soon as possible. Although it is quite extensive, I hope you will find it interesting and it should not take too long to complete. The information will be very valuable for our research.

Over the next few months we will be running some programmes emphasising exercise, mood and body image. There is a section at the end of the questionnaire where you can indicate whether you would be interested in taking part in this.

Thank you again for taking the time to contact us and complete the questionnaire.

Yours sincerely,

Carolyn Edwards
Researcher

- You do not have to take part in this study if you do not want to. If you do decide to take part you may withdraw at any time without giving a reason.

- Information collected for the purposes of the study will be stored anonymously and treated as confidential and secure.

- All proposals for research using human subjects are reviewed by an ethics committee before they can proceed. This proposal was reviewed by the joint UCL UCLH Committees on the Ethics of Human Research.
A study of health and well-being in overweight women

Please read through the questionnaire and answer all the questions. There are no right or wrong answers. Please **do not miss out** any questions.

The answers you give will be confidential. They will be seen only by the researcher.

**SECTION ONE**
First, it would help us if you could complete the following details about yourself:

**NAME:**

**DATE OF BIRTH:**

**DATE OF BIRTH:**

**TODAY'S DATE:**

**DATE OF BIRTH:**

**MARITAL STATUS:**
- Married □
- Separated/divorced □
- Widowed □

*(Please tick one box)*

**OCCUPATION:**

**SECTION TWO**

1. What is your weight (in stones and pounds)?

2. What has your maximum weight been (excluding pregnancy)?

3. What is your height (in feet and inches)?

4. Are you currently on any diet?
   - YES □
   - NO □

*(Please tick one box)*

5. Do you currently take any exercise?
   - YES □
   - NO □

*(Please tick one box)*

If yes, please detail: ________________________________

Page 1
6. Are you currently on any medication?  
   (Please tick one box)  
   YES □ 1  If yes, please specify:  
   NO □ 2

7. Do you suffer from any serious illnesses?  
   (Please tick one box)  
   YES □ 1  If yes, please specify:  
   NO □ 2

SECTION THREE
1. At what age were you first overweight? □ □ Years
2. Is/was your mother overweight?  
   (Please tick one box)  
   YES □ 1
   NO □ 2
3. Is/was your father overweight?  
   (Please tick one box)  
   YES □ 1
   NO □ 2
4. a) How many siblings do you have? □ □
   b) How many are overweight? □ □
5. How would you describe your current weight? (Please tick one box)  
   Underweight □ 1
   About the right weight □ 2
   Somewhat overweight □ 3
   Very overweight □ 4
   Extremely overweight □ 5

6. Using the scale very satisfied (1) to very dissatisfied (5) please answer the following questions by ticking the appropriate box.
   a) How satisfied do you feel with your current weight? □ 1 □ 2 □ 3 □ 4 □ 5
   b) How satisfied do you feel with your current body shape? □ 1 □ 2 □ 3 □ 4 □ 5

Page 2
estimate how many times you have tried this method (a rough estimate is all that is required)

If YES, estimate the number of times tried

<table>
<thead>
<tr>
<th></th>
<th>YES □</th>
<th></th>
<th>NO □</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>A specific diet</td>
<td>□1</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>A specific exercise program</td>
<td>□1</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>Drugs or pills</td>
<td>□1</td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>Other (please specify below)</td>
<td>□1</td>
<td></td>
</tr>
</tbody>
</table>

SECTION FOUR
The following questions should be answered with respect to two different time periods. Using the scale never (1) to very often (5), rate how often you have experienced the following:

a) during the period when you were **growing up** (between the ages of 5 and 16).
b) over the **past year**.

Please read each statement and circle the number that is most appropriate

<table>
<thead>
<tr>
<th></th>
<th>DURING CHILDHOOD</th>
<th>IN THE PAST YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>People made fun of you because you were heavy</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2.</td>
<td>People made jokes about you being too heavy</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3.</td>
<td>People laughed at you for trying out for sports because you were heavy</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4.</td>
<td>People called you names like “fatso”</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5.</td>
<td>People pointed at you because you were overweight</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6.</td>
<td>People sniggered about your heaviness when you walked into a room alone</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7.</td>
<td>People told you that you would never be a success because of your weight</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
Please read the following instructions carefully:

The following questions will ask you about your body size/shape. Answer according to the PAST FOUR WEEKS. To answer the questions, you may choose ANY NUMBER FROM 0-6, even if there is no description next to it.

Record your response by crossing through the appropriate number e.g. X

1) How dissatisfied have you been with your body size/shape?
- no dissatisfaction
- slight dissatisfaction (but no feelings of distress)
- moderate dissatisfaction (with some feeling of distress)
- extreme dissatisfaction (with extreme distress could not imagine feeling more upset or dissatisfied)

2) How often have you thought about your body size/shape AND felt upset as a result?
- (0 days) never think about my body size/shape with upset feelings
- (1-3 days)
- (4-7 days) think about it and feel upset once or twice a week
- (8-11 days)
- (12-16 days) think about it and feel upset on about half the days
- (17-21 days)
- (22-28 days) think about it and feel upset every or almost every day

3) Have you ever thought your body size / shape might not be as bad as you generally think or have there been times that you’ve felt significantly better about your body size/shape?

YES □  NO □

4) How much have you worried or felt embarrassed about your body size/shape when you were in public areas such as shops, city streets, restaurants, cinemas, clubs, buses, parks, beaches, public rest rooms, or other areas where mainly there were people you didn’t know? (when answering, think about how many of these situations you worry in and how intense your worrying is)

- no worrying or embarrassment
- slight amount of worrying or embarrassment
- moderate amount of worrying or embarrassment
- extreme worrying or embarrassment

5) How much have you worried or felt embarrassed about your body size/shape when you were in social settings with co-workers, acquaintances, friends or family members (for example, at work, parties, family gatherings, meetings, talking in groups, having a conversation, dating or going on an outing with others, speaking to a boss or supervisor)?

- no worrying or embarrassment
- slight amount of worrying or embarrassment
- moderate amount of worrying or embarrassment
- extreme worrying or embarrassment

6) How much have you avoided public areas because you have felt uncomfortable about your body size/shape? (such areas might include shops, city streets, restaurants, cinemas, clubs, buses, parks, beaches, public rest rooms, or other areas where mainly there would be people you didn’t know?)

- no avoidance of public situations
- avoided with slight frequency
- avoided with moderate frequency
- avoided with extreme frequency
How much have you avoided work or other social situations with friends, relatives or acquaintances because you felt uncomfortable about your body size/shape? Social situations could include going to work, parties, family gatherings, meetings, being in groups, having a conversation, dating or going on an outing with others, speaking to a boss or supervisor.

- no avoidance of social situations
- avoided with slight frequency
- avoided with moderate frequency
- avoided with extreme frequency

How much have you avoided close physical contact with others because of your body size/shape? This includes sexual activity as well as other close contact such as shaking hands, hugging, using or dancing close.

- no avoidance of physical contact
- avoided with slight frequency
- avoided with moderate frequency
- avoided with extreme frequency

How much have you avoided physical activities such as exercise or outdoor recreation because of feeling self-conscious or uncomfortable due to your body size/shape?

- no avoidance of public situations
- avoided with slight frequency
- avoided with moderate frequency
- avoided with extreme frequency

10) How upset have you become when someone was noticing or paying attention to your body size/shape? (When answering, think about whether you feel differently depending on who the person is that notices).

- not upsetting (or others do not notice)
- slightly upsetting when certain people are involved but not others
- moderately upsetting when certain people are involved but not others
- moderately upsetting regardless of who is involved
- extremely upsetting when certain people are involved
- extremely upsetting regardless of who is involved

11) How important has appearance been in how you evaluate yourself as a person? Before answering, think about other things that influence how you judge yourself such as personality, intelligence, work performance, quality of your relationships, ability in other areas and so on. Compared to these (and maybe others), how much importance have you given to appearance when evaluating yourself?

- no importance
- some importance (definitely an aspect of self-evaluation)
- moderate importance (one of the main aspects of self-evaluation)
- extreme importance (nothing is more important as a means of evaluating yourself)

12) How negatively have you thought of yourself as a person as a result of your body size/shape? This question is not asking whether you think your appearance is attractive or unattractive. Rather, it is asking how much your appearance made you feel that you had a personal flaw or were undesirable or inadequate in a non-physical way.

- no negative evaluation of yourself resulting from your body size/shape
- slightly negative evaluations of yourself
- moderately negative evaluations of yourself
- extremely negative evaluations of yourself; your body size/shape makes you unable to find positive qualities in yourself.
SECTION SIX
Using the scale *not at all characteristic of me* (1) to *extremely characteristic of me* (5) indicate which of the following apply to you. Please read each statement and tick the box that applies to you at the moment.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all characteristic</th>
<th>Slightly characteristic</th>
<th>Moderately characteristic</th>
<th>Very characteristic</th>
<th>Extremely characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am comfortable with the appearance of my physique/figure</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>2. I would worry about wearing clothes that make me look too thin or overweight</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>3. I wish I wasn’t so uptight about my physique/figure</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>4. There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>5. When I look in the mirror I feel good about my physique/figure</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>6. Unattractive features of my physique/figure make me nervous in certain social settings</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>7. In the presence of others, I feel apprehensive about my physique/figure</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>8. I am comfortable with how fit my body appears to others</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
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<tr>
<td>9. It would make me uncomfortable to know others were evaluating my physique/figure</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>10. When it comes to displaying my physique/figure to others, I am a shy person</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>11. I usually feel relaxed when it is obvious that others are looking at my physique/figure</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
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<tr>
<td>12. When in a bathing suit, I often feel nervous about the shape of my body</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
</tbody>
</table>
This section describes some typical eating situations. Everyone has situations which make it very hard for them to keep their weight down. The following are a number of situations relating to eating patterns and attitudes.

Read each situation listed below and decide how confident (or certain) you are that you will be able to resist eating in each of the difficult situations. In other words, pretend that you are in the eating situation right now. On a scale from 0 (not confident) to 9 (very confident), choose ONE number that reflects how confident you feel now about being able to successfully resist the desire to eat right now. Write this number down next to each item.

<table>
<thead>
<tr>
<th>Not confident at all that you can resist the desire to eat</th>
<th>Very confident that you can resist the desire to eat</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9</td>
<td>CONFIDENCE NUMBER</td>
</tr>
</tbody>
</table>

Examples

I AM CONFIDENT THAT:

1. I can control my eating on weekends
2. I can say "no" to snacks

I AM CONFIDENT THAT:

1. I can resist eating when I am anxious (nervous)
2. I can control my eating on the weekends
3. I can resist eating even when I have to say "no" to others
4. I can resist eating when I feel physically run down
5. I can resist eating when I am watching TV
6. I can resist eating when I am depressed (or down)
7. I can resist eating when there are many different kinds of food available
8. I can resist eating even when I feel it is impolite to refuse a second helping
9. I can resist eating even when I have a headache
10. I can resist eating when I am reading
11. I can resist eating when I am angry (or irritable)
12. I can resist eating even when I am at a party
13. I can resist eating even when others are pressuring me to eat
14. I can resist eating when I am in pain
15. I can resist eating just before going to bed
16. I can resist eating when I have experienced failure
17. I can resist eating even when high-calorie foods are available
18. I can resist eating even when I think others will be upset if I don’t eat
19. I can resist eating when I feel uncomfortable
20. I can resist eating when I am happy
**SECTION EIGHT**

In this section, we would like to ask you about your views on exercise.

1. Which of the following things would you say are “exercise”? *You may tick more than one box*

<table>
<thead>
<tr>
<th>Activity</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Team sports (hockey, football etc)</td>
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<tr>
<td>Dancing</td>
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<tr>
<td>Aerobics</td>
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<tr>
<td>Shopping</td>
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<tr>
<td>Walking</td>
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<tr>
<td>Housework</td>
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<tr>
<td>Snooker</td>
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<tr>
<td>Gardening</td>
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<tr>
<td>Playing darts</td>
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<tr>
<td>Jogging</td>
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<tr>
<td>Golf</td>
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<tr>
<td>Playing bowls</td>
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<tr>
<td>Fishing</td>
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<tr>
<td>Roller skating</td>
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</table>

2. Please say how much you agree, disagree or strongly agree/disagree with the following questions. Please answer each question, please tick one box per question. When answering, remember that it is YOUR opinion that we are interested in.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Exercise helps prevent heart disease</td>
<td></td>
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<td></td>
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<tr>
<td>2. Exercise develops your body strength</td>
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<tr>
<td>3. Exercise gives you high blood pressure</td>
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<tr>
<td>4. Exercise helps you lose weight</td>
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<tr>
<td>5. Exercise shortens your life</td>
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<tr>
<td>6. Exercise generally makes people feel depressed</td>
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<tr>
<td>7. Exercise helps you to relax</td>
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<tr>
<td>8. Exercise can injure you</td>
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<tr>
<td>9. Exercise improves muscle tone</td>
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<tr>
<td>10. Exercise improves overall appearance/shape</td>
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<tr>
<td>11. Exercise can make a person feel good physically and emotionally</td>
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<tr>
<td>12. Exercise gives a person more energy</td>
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<tr>
<td>13. Exercise helps people manage their problems better</td>
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<td></td>
</tr>
<tr>
<td>14. Exercise helps people feel more attractive</td>
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</tr>
</tbody>
</table>
All sorts of things stop us from getting more exercise. Please answer the following, saying whether you agree, disagree or strongly agree/disagree with each item. Please tick one box per item.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I am not the sporty type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I have not got the time to exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>There is no-one to exercise with</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>My health is not good enough</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I need to rest and relax in my spare time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I might get injured or damage my health</td>
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<td></td>
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<tr>
<td>7</td>
<td>I don’t enjoy exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I would never keep up exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I am too fat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I can’t afford it</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>I’m not very good at sport</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I don’t like wearing work-out clothing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Exercising makes me feel unattractive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION NINE
1. Over the past 8 weeks (approximately 2 months) have you done any of the following for more than 15 minutes during your free time? Please write the appropriate number in each box and also indicate what type of exercise you did (if any).

<table>
<thead>
<tr>
<th>Number of weeks exercised for more than 15 mins in last 8 weeks</th>
<th>Average no. of times per week</th>
<th>Type of exercise you did</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A) STRENUOUS EXERCISE
(Heart beats rapidly e.g. running, jogging, hockey, squash, circuit training/gym, skiing, judo, roller-blading, vigorous swimming, vigorous cycling)

B) MODERATE EXERCISE
(Not too exhausting e.g. fast walking, tennis, easy cycling, badminton, easy swimming, dancing)

C) MILD EXERCISE
(Minimal effort e.g. yoga, archery, bowling golf, easy walking)

Page 9
2. In which of the following settings have you exercised in the past two months (approximately 8 weeks)? (Please tick all boxes that apply)
   - At home  □
   - Health/Fitness club  □
   - Outdoors/Park  □
   - Other  □ Please specify.

3. Do you think you get enough exercise at present to keep you fit? (Tick one box only)
   - YES  □
   - NOT SURE  □
   - NO  □

4. Compared to other people your age, would you say you were? (Tick one box only)
   - Very Fit  □
   - Fairly Unfit  □
   - Fairly Fit  □
   - Very Unfit  □

SECTION TEN
Here is a list of statements dealing with your general feelings about yourself. Please indicate how much you agree/disagree with each statement by ticking the appropriate box.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. On the whole, I am satisfied with myself</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>2. At times, I think I am no good at all</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>3. I feel that I have a number of good qualities</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>4. I am able to do things as well as most other people</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>5. I feel I do not have much to be proud of</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>6. I certainly feel useless at times</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>7. I feel that I am a person of worth, at least on an equal plane with others</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>8. I wish I could have more respect for myself</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>9. All in all, I am inclined to feel that I am a failure</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>10. I take a positive attitude toward myself</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
Please read through the questionnaire, and check that you have answered all the questions. Once you have read the information below, please could you put the questionnaire in the FREEPOST envelope provided and return it to us, as soon as possible.

THANK YOU VERY MUCH FOR YOUR TIME AND CO-OPERATION!

Where did you first hear about this study?

(If it was from a newspaper, please state which one)

Over the next few months we will be running some programmes emphasising exercise, mood/stress management and body image. The programmes will involve coming to the University College London (WC1) at least twice, and possibly three times (we would not be able to meet any travel expenses).

Please indicate how interested you would be in taking part each of the following programmes by ticking one box for each item.

<table>
<thead>
<tr>
<th></th>
<th>Definitely NOT Interested</th>
<th>Possibly interested</th>
<th>Definitely Interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Mood/ Stress management</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Body image</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

Please could write your address below so that we can send you more details/ offer you an appointment. (If you do not wish to take part in any of the above, you may still wish to provide your address so that we can contact you in the future regarding other studies).

ADDRESS:

[Space for address]

post code

If you have indicated that you are either possibly or definitely interested in taking part in any of the above, please complete the following information about your availability.

1. Would you be able to commit yourself to an 8 week programme?

<table>
<thead>
<tr>
<th></th>
<th>Definitely NOT</th>
<th>Probably</th>
<th>Definitely YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely NOT</td>
<td>□</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>Possibly</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

Page 11
2. Do you have any holidays booked between now and end of July 1998?

NO □

YES □ ☐ If you do, and you still want to take part in a programme, it would be helpful if you could let us know the dates you will be away on holiday.

3. Would you be able to come to an assessment at University College London, Torrington Place, London, WC1 in the next 2-6 weeks?

YES □ NO □ UNSURE □

4. What times/ days would not be convenient for you to come for an assessment? (Please tick the boxes indicating inconvenient times).

<table>
<thead>
<tr>
<th>AM</th>
<th>PM</th>
<th>Evening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Tuesday</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Wednesday</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Thursday</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AM</th>
<th>PM</th>
<th>Evening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Saturday</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Sunday</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

5. Are there any other specific dates over the next few weeks which would be inconvenient? Please detail:

6. Do you have a telephone number where we could reach you?

Daytime Tel: .............................................

Or Evening Tel: ...........................................

If you have indicated you are interested in attending in any of the above programmes, we will send you more details in the post.
Dear

Re: Study of Health and well-being in overweight women

Thank you for returning the questionnaire we recently sent to you about the study we are conducting at University College London (UCL). We are interested, specifically, in finding out the impact on health and well-being of a walking program.

What the study involves
If you decide to participate in the study, you will receive an individually tailored walking program to carry out over 8 weeks. The program will build up gradually and at its maximum will involve 30 minutes of brisk walking a day, 5 days a week.

Before starting the program you will be invited to the University for an assessment, during which you will be measured and weighed. The assessments will take approximately 1-1½ hours and you will need to attend 2 or 3 times over a few months. Unfortunately, we are unable to pay any travel expenses.

What to do next
Before you can take part in the study, we need your G.P.'s consent. If you are still interested in participating in the study, please could you return the slip below AS SOON AS POSSIBLE so that we can contact your G.P.

Many thanks
Yours sincerely,

Carolyn Edwards MSc, BSc
Researcher

Yes, I am still interested in taking part in the study.

My name: .................................................................

GP name: .............................................................

GP Address: ...........................................................

GP Telephone no: ..................................................

Please return asap to: Carolyn Edwards, Sub-Department of Clinical Health Psychology, University College London, Gower Street, London. WC1E 6BT.
Dear

I have recently received your GP’s consent to your participation in the study of health and well-being in overweight women and am writing to offer you an appointment on

.............................................................at.....................................

Please allow approximately 1½ hours for the assessment which will involve being measured, weighed and completing a few more questionnaires. During the assessment you will have the opportunity to discuss the walking program designed for you. As the assessment involves taking some body measurements please wear comfortable clothes.

Please could you confirm whether or not you will be able to attend this appointment as soon as possible by telephoning 0171-209 6643.

The assessment will take place at University College London, 1-19 Torrington Place (just off Tottenham Court Rd). Please find a map enclosed.

I look forward to meeting you. Please report to the porters at reception on arrival.

Yours sincerely,

Carolyn Edwards, BSc., MSc.
Researcher
Dear Dr. 

Re your patient:

The above patient is interested in taking part in a research study we are conducting at UCL on the health and psychological benefits of exercise in overweight women. As part of the study, she will be asked to take a 30 minute brisk walk, 5 days a week (in line with the guidelines by the Centres for Disease Control and the American College of Sports Medicine, 1995).

We would be grateful if you could sign the form below to confirm that, to the best of your knowledge, your patient does not have any health problems which would preclude her participation in this walking program.

Should you wish to discuss the study further, please do not hesitate to contact me on [contact information].

Many thanks.
Yours sincerely,

Carolyn Edwards
Clinical Psychologist in Training
Project Supervisor: Professor Jane Wardle, Health Behaviour Unit

Please delete as appropriate:

I certify that, to the best of my knowledge, there is no medical reason why [patient name] should not participate in this study which involves brisk walking.

or

I feel that there are medical reasons which preclude this patient from participating in the study.

Signature: ____________________________ Date: ..................../ ......../ 1998

Please print name: ____________________________

Please return to: Carolyn Edwards
Sub-Dept. Clinical & Health Psychology (1-19, Torrington Place)
UNIVERSITY COLLEGE LONDON
London WC1E 6BT
Health and Well-being in overweight women

INFORMATION SHEET

What the study is about:
We are inviting you to participate in a study of health and well-being of overweight women. We are interested, specifically, in finding out the impact on health and well-being of a walking program.

What the study involves:
You will receive an individually tailored walking program, to carry out for 8 weeks. The program will build up gradually and at its maximum will involve 30 minutes of walking a day, 5 days a week.

Before starting the program, you will be invited to the University for an assessment, during which you will have an opportunity to discuss the walking programme designed for you. The assessment will also involve being weighed, measured and completing some questionnaires. The assessments will take approximately 1-1½ hours and you will need to attend a total of 2 or 3 separate times over a few months.

• You do not have to take part in this study if you do not want to. If you decide to take part you may withdraw at any time without giving a reason.

• Information collected for the purposes of the study will be stored anonymously and treated as confidential and secure.

• All proposals for research using human subjects are reviewed by an ethics committee before they can proceed. This proposal was reviewed by the joint UCL, UCLH Committees on the Ethics of Human Research.

Researchers: Professor Jane Wardle and Carolyn Edwards.
Health and Well-being in overweight women

CONSENT FORM

Circle appropriate response

Have you read the information sheet about this study? YES/NO

Have you had an opportunity to ask questions and discuss this study? YES/NO

Have you received satisfactory answers to all your questions? YES/NO

Have you received enough information about this study? YES/NO

Do you agree to take part in this study? YES/NO

I consent to take part in this study of health and well-being. I understand that I may withdraw from the study at any time without having to give a reason.

Signed: .......................................................... Date .../.../.....

Please print name: ..........................................................

Signature of Witness: .......................................................... Date .../.../.....

Researchers: Professor Jane Wardle and Carolyn Edwards
Health Behaviour Unit,
University College London
Gower Street
London
WC1E 6BT
(Tel no to be confirmed)
APPENDIX G
INSTRUCTIONS-- PLEASE READ CAREFULLY

The following pages contain a series of statements and questions about how people might think, feel or behave. You are asked to indicate the extent to which each item relates to you personally.

There are no right or wrong answers. Just give the answer that is most accurate for you. Each question asks you to put a tick or cross in a box or circle an item.

If you find that the choices to be used in answering do not adequately indicate your opinion, please use the one which is closest to the way you feel.

Please do not miss out any questions.

The answers you give will be confidential. They will only be seen by the researcher.

NAME:  

Date of Birth:  

Today’s Date:  

FITNESS

1. On a scale of 0-10 (0= not at all fit, 10= very fit), how fit do you feel at the moment? Circle the most appropriate number below:

   Not at all fit 0 1 2 3 4 5 6 7 8 9 10 Very fit

2. Over the last 8 weeks do you feel that your level of fitness is

   Please tick one box

   about the same as usual □ 1 better than usual □ 2 worse than usual □ 3
SECTION ONE

This section relates to how you feel about your appearance.

1. Using the scale ‘definitely agree’ (1) to ‘definitely disagree’ (5) tick the box that indicates how much you agree/disagree with each of the following statements. **Tick one box per item**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Scale</th>
<th>Definitely Agree</th>
<th>Mostly Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Mostly Disagree</th>
<th>Definitely Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before going out in public I always notice how I look.</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I am careful to buy clothes that will make me look my best.</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>My body is sexually appealing.</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I like my looks just the way they are</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I check my appearance in a mirror whenever I can.</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>Before going out, I usually spend a lot of time getting ready</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>Most people would consider me good-looking</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>It is important that I always look good</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I use very few grooming products</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I like the way I look without my clothes on</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I am self-conscious if my grooming isn’t right</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I usually wear whatever is handy without caring how it looks</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I like the way my clothes fit me</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I don’t care what people think about my appearance</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I take special care with my hair grooming</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I dislike my physique</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I am physically unattractive</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I never think about my appearance</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>I am always trying to improve my physical appearance</td>
<td></td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
</tbody>
</table>
2. Using the scale 'very satisfied' (1) to 'very dissatisfied' (7) below, indicate how satisfied you currently feel with each of the following areas or aspects of your body. Please tick one box per item/body part.

<table>
<thead>
<tr>
<th>Area</th>
<th>very satisfied</th>
<th>moderately satisfied</th>
<th>slightly satisfied</th>
<th>undecided</th>
<th>slightly dissatisfied</th>
<th>moderately dissatisfied</th>
<th>very dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waist</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Stomach</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Chest</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Buttocks</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Hips</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Thighs</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Calves</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Upper arms</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Lower arms</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>(between elbow &amp; wrist)</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Muscle tone</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Weight</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
<tr>
<td>Overall Appearance/shape</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
<td>□ 7</td>
</tr>
</tbody>
</table>

3. Imagine that you are walking along a crowded beach in a swimming costume. Using the scale below indicate how anxious, tense or nervous you would feel about specific parts of your body in this situation.

<table>
<thead>
<tr>
<th>Feeling</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>Slightly</td>
<td>Moderately so</td>
<td>Very much so</td>
<td>Exceptionally</td>
<td></td>
</tr>
<tr>
<td>I would feel anxious, tense, or nervous about</td>
<td>[</td>
<td>[</td>
<td>[</td>
<td>[</td>
<td>[</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area</th>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately so</th>
<th>Very much so</th>
<th>Exceptionally</th>
</tr>
</thead>
<tbody>
<tr>
<td>The extent to which I look overweight</td>
<td>□ 0</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
<tr>
<td>My thighs</td>
<td>□ 0</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
<tr>
<td>My buttocks</td>
<td>□ 0</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
<tr>
<td>My hips</td>
<td>□ 0</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
<tr>
<td>My stomach</td>
<td>□ 0</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
<tr>
<td>My legs</td>
<td>□ 0</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
<tr>
<td>My waist</td>
<td>□ 0</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
<tr>
<td>My muscle tone</td>
<td>□ 0</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
</tbody>
</table>
4. Using the scale 'never' (0) to 'always' (5) please tick the box that best describes how often you engage in the following behaviours at the present time.

<table>
<thead>
<tr>
<th></th>
<th>Statement</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I wear baggy clothes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I wear clothes I do not like</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I wear darker colour clothing</td>
<td></td>
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<tr>
<td>4</td>
<td>I wear a special set of clothing e.g. my &quot;fat clothes&quot;</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5</td>
<td>I restrict the amount of food I eat</td>
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<tr>
<td>6</td>
<td>I only eat fruits, vegetables and other low calorie foods</td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>I fast for a day or longer</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>I do not go out socially if I will be &quot;checked out&quot;</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>I do not go out socially if the people I am with will discuss weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I do not go out socially if the people I am with are thinner than me</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>11</td>
<td>I do not go out socially if it involves eating</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>12</td>
<td>I weigh myself</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>13</td>
<td>I am inactive</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>14</td>
<td>I look at myself in the mirror</td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>I avoid physical intimacy</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>16</td>
<td>I wear clothes that will divert attention from my weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>17</td>
<td>I avoid going clothes shopping</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>18</td>
<td>I don’t wear &quot;revealing&quot; clothes e.g. swimsuits, tank tops or shorts</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>I get dressed up or made up</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
SECTION TWO

Please read each group of the following statements carefully and then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including item 19 (changes in appetite) or item 21 (changes in sleeping pattern).

1. Sadness
   - 0 I do not feel sad
   - 1 I feel sad much of the time
   - 2 I am sad all the time
   - 3 I am so sad or unhappy that I can’t stand it

2. Pessimism
   - 0 I am not discouraged about my future
   - 1 I feel more discouraged about my future than I used to be
   - 2 I do not expect things to work out for me
   - 3 I feel my future is hopeless and will only get worse

3. Past Failure
   - 0 I do not feel like a failure
   - 1 I have failed more than I should have
   - 2 As I look back, I see a lot of failures
   - 3 I feel I am a total failure as a person

4. Loss of Pleasure
   - 0 I get as much pleasure as I ever did from the things I enjoy
   - 1 I don’t enjoy things as much as I used to
   - 2 I get very little pleasure from the things I used to enjoy
   - 3 I can’t get any pleasure from the things I used to enjoy

5. Guilty Feelings
   - 0 I don’t feel particularly guilty
   - 1 I feel guilty over many things I have done or should have done
   - 2 I feel quite guilty most of the time
   - 3 I feel guilty all of the time

6. Agitation
   - 0 I am no more restless or wound up than usual
   - 1 I feel more restless or wound up than usual
   - 2 I am so restless or agitated that it’s hard to stay still
   - 3 I am so restless or agitated that I have to keep moving or doing something

7. Punishment Feelings
   - 0 I don’t feel I am being punished
   - 1 I feel I may be punished
   - 2 I expect to be punished
   - 3 I feel I am being punished

8. Self-Dislike
   - 0 I feel the same about myself as ever
   - 1 I have lost confidence in myself
   - 2 I am disappointed in myself
   - 3 I dislike myself

9. Self-criticalness
   - 0 I don’t criticise or blame myself more than usual
   - 1 I am more critical of myself than I used to be
   - 2 I criticise myself for all of my faults
   - 3 I blame myself for everything bad that happens

10. Suicidal thoughts or wishes
    - 0 I don’t have any thoughts of killing myself
    - 1 I have thoughts of killing myself, but I would not carry them out
    - 2 I would like to kill myself
    - 3 I would kill myself if I had the chance

11. Crying
    - 0 I don’t cry anymore than I used to
    - 1 I cry more than I used to
    - 2 I cry over every little thing
    - 3 I feel like crying but I can’t

12. Irritability
    - 0 I am no more irritable than usual
    - 1 I am more irritable than usual
    - 2 I am much more irritable than usual
    - 3 I am irritable all the time

13. Concentration difficulty
    - 0 I can concentrate as well as ever
    - 1 I can’t concentrate as well as usual
    - 2 It’s hard to keep my mind on anything for very long
    - 3 I find I can’t concentrate on anything
14. **Loss of interest**  
0 I have not lost interest in other people or activities  
1 I am less interested in other people or things than before  
2 I have lost most of my interest in other people or things  
3 It's hard to get interested in anything  

15. **Indecisiveness**  
0 I make decisions about as well as ever  
1 I find it more difficult to make decisions than usual  
2 I have much greater difficulty in making decisions than I used to  
3 I have trouble making any decisions  

16. **Worthlessness**  
0 I do not feel I am worthless  
1 I don't consider myself as worthwhile and useful as I used to  
2 I feel more worthless as compared to other people  
3 I feel utterly worthless  

17. **Loss of energy**  
0 I have as much energy as ever  
1 I have less energy than I used to have  
2 I don't have enough energy to do very much  
3 I don't have enough energy to do anything  

18. **Loss of interest in sex**  
0 I have not noticed any recent change in my interest in sex  
1 I am less interested in sex than I used to be  
2 I am much less interested in sex now  
3 I have lost interest in sex completely  

19. **Changes in appetite**  
0 I have not experienced any change in my appetite  
1a My appetite is somewhat less than usual  
1b My appetite is somewhat greater than usual  
2a My appetite is much less than before  
2b My appetite is much greater than usual  
3a I have no appetite at all  
3b I crave food all the time  

20. **Tiredness or Fatigue**  
0 I am no more tired or fatigued than usual  
1 I get more tired or fatigued more easily than usual  
2 I am too tired or fatigued to do a lot of the things I used to do  
3 I am too tired or fatigued to do most of the things I used to do  

21. **Changes in sleeping pattern**  
0 I have not experienced any change in my sleeping pattern  
1a I sleep somewhat more than usual  
1b I sleep somewhat less than usual  
2a I sleep a lot more than usual  
2b I sleep a lot less than usual  
3a I sleep most of the day  
3b I wake up 1-2 hours early and can't get back to sleep
1. Using the following scale, please rate how much you agree/ disagree with each of the following statements, by ticking one box per item:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree strongly</th>
<th>Agree somewhat</th>
<th>Agree slightly</th>
<th>Disagree slightly</th>
<th>Disagree somewhat</th>
<th>Disagree strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I have excellent reflexes</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
</tr>
<tr>
<td>2. I am not agile and graceful</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
</tr>
<tr>
<td>3. My physique is rather strong</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
</tr>
<tr>
<td>4. I can’t run fast</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I don’t feel in control when I take tests involving physical dexterity</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
</tr>
<tr>
<td>6. I have poor muscle tone</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
</tr>
<tr>
<td>7. I take little pride in my ability in sports</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
</tr>
<tr>
<td>8. My speed has helped me out of some tight spots</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
</tr>
<tr>
<td>9. I have a strong grip</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
</tr>
<tr>
<td>10. Because of my agility, I have been able to do things that many others could not do</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
<td>□ 6</td>
</tr>
</tbody>
</table>

SECTION FOUR

1. Using the scale below, please indicate to what extent you think the walking program will improve your:

<table>
<thead>
<tr>
<th>Improvement</th>
<th>To a very great extent</th>
<th>To some extent</th>
<th>Hardly at all</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Fitness</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
<tr>
<td>b. Physical appearance</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
<tr>
<td>c. Psychological well-being</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
<tr>
<td>d. Overall health status</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
</tr>
</tbody>
</table>
WALKING PROGRAM

This program is designed to be carried out over 8 weeks. You will find that it gradually builds up to walking 30 minutes a day, 5 days a week. It is important that you try and follow your program as closely as you can. You will be asked to keep a log of your walking regime and to send this to Carolyn every Friday. If you have any problems you can leave a message on (0171) 209 6643.

Things to consider before you start walking

Clothing  Wear something you feel comfortable in e.g. jogging trousers and sweatshirt. If it’s very cold you might wear a cotton T-shirt, several sweatshirts and a light windbreaker. The cotton will absorb the perspiration.

Shoes  Make sure you wear a good, comfortable pair.

Weather  If it is hot on some of the days you are walking, go out either early morning or wait until the evenings when it is cooler, avoid the middle of the day. Drink plenty of water. It is safe to drink water before, during and after exercise.

Time  You will probably find it easier if you are able to stick to the same time each day to go for your walk. You will see that your program gradually builds up from 5-30 minutes of brisk walking 5 days a week. If you find it impossible to spare 30 minutes, you could split it up so that you go out twice a day for 15 minutes.

Warming up and cooling down  It is important to warm up before exercise and cool down afterwards. This will help to stretch muscles and avoid strains and pulls. Walking slowly is a good warm-up for brisk walking. You should warm-up and cool down for at least 5 minutes for a 30-minute bout of exercise.

How to take your Heart Rate

1. Select either wrist
2. Wrap the fingers of your other hand around the back of the wrist
3. Press your index and middle fingers on the upturned wrist until you feel the regular pulsing of the blood through your vein.
4. Count the number of beats in exactly 15 seconds.
5. Multiply by four to calculate your beats per minute.

There are two times to take your pulse. The first is when you are at rest, before you start each walking session. Be still for at least five minutes, then take your pulse and record it in the ‘Resting Heart Rate’ column of the log book. The second time you take your pulse is during your walking program. Halfway through each session, take your pulse as above and record it in the ‘Exercise Heart Rate’ column on the log book.
How fast should I be walking?

You should be walking briskly yet comfortably. Although you should feel slightly out of breath you should still be able to hold a conversation. When you take your ‘Exercise Heart Rate’ it should be roughly between ... and ... beats per minute (remember to take your pulse rate for 15 seconds and multiply your pulse rate by four). If it is lower than ..., walk a bit faster. You might want to check your pulse again a few minutes later to check that you are walking at the correct speed. You will soon get used to how fast you need to be walking. You will be asked to keep a record of how much you feel you exerted yourself each time you go walking.

REMEMBER To have its maximum effect, the brisk walking will need to be on top of the walking that you already do. It is important that you do not record what you do already as ‘brisk walking’.

PROGRAM

Your walking program is described below. You will find that it builds up gradually from 5-30 minutes of brisk walking plus warm-up and cool down periods. It is important to build up gradually, trying to do too much too soon will only result in you becoming discouraged and frustrated. If you find the program easy to start off with, carry on adding to the length of times you are walking briskly as described in the program.

<table>
<thead>
<tr>
<th>Week 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Start walking at a leisurely pace for 5 minutes. Spend 5-10 minutes walking ‘briskly’ before checking your pulse as described above so that you become familiar with how fast you need to walk. If you have not been walking fast enough, try and increase your pace for 2-3 minutes and check your pulse again. Warm down by spending 3-5 minutes walking at a leisurely pace.</td>
</tr>
<tr>
<td>Day 2</td>
<td>Repeat as per day 1. If you found this very easy, increase your ‘brisk walking’ from 5 to 10-15 minutes. Remember to spend 5 minutes ‘warming up’ by starting walking at a leisurely pace and the same length of time at the end of each walking session to ‘cool down’.</td>
</tr>
<tr>
<td>Days 3-5</td>
<td>Repeat as above, don’t worry if you are still only managing to walk briskly for 5 minutes at this stage. You should not be walking briskly for more than 15 minutes.</td>
</tr>
</tbody>
</table>
### Week 2
#### Days 1-3
Add five more minutes of brisk walking to the time you were doing in days 3-5 of week 1. Keep to this over the next two days. For example, if you were still walking for only 5 minutes at the end of last week, increase your brisk walking time to 10 minutes. If you were walking briskly for 15 minutes, increase your time to 20 minutes. Remember to warm up and down as before and remember to check your pulse.

Day 4
Increase your period of brisk walking by another 5 minutes

Day 5
Repeat the brisk walking times you did on Day 4.

### Week 3
#### Days 1-3
Increase your period of brisk walking by a further 5 minutes. You should now be walking briskly for a minimum of 20 minutes and a maximum of 30 minutes. If you are now walking 30 minutes briskly, remain at this level for the rest of the 8 weeks.

Day 4
If you are not yet brisk walking for half an hour, continue to add an extra five minutes to your walking schedule.

Day 5
Repeat the walking times you did on Day 4.

### Week 4
#### Day 1-5
If you are not already brisk walking for half an hour, over this week add the last five minutes of brisk walking to your schedule. If this seems hard, you could add just a minute a day.

If you are walking briskly for half an hour a session, this is the maximum you will need to do although always remember to spend 5 minutes walking at a leisurely pace at either end of walking briskly for warming up and down.

### Weeks 5-8
Continue walking briskly for 30 minutes, on 5 days a week. If this is too hard to fit into your daily routine, you could go out for 15 minutes, twice a day.

### What happens if I miss a day?
If you find it impossible to walk for half an hour a day, try two lots of 15 minutes. If you find that you have not managed walking on a day that you planned to - DON'T GIVE UP, keep going with the program and record the walking you do manage to do on your diary sheet.
# WALKING DIARY

**NAME:**

Please return diary every FRIDAY to: Carolyn Edwards  
Sub-Dept. of Clinical Health Psychology (1-19, Torrington Place)  
University College London  
London. WC1E 6BT

Fax:

| Date | Time of day | Duration of time walked | Resting Heart Rate | Exercise Heart Rate | Distance walked (record in miles if you have a Pedometer) | What was your rating of Perceived exertion?  
(see scale above) | How did you feel at the end of walking?  
*Circle one number*  
1 = Excellent  
2 = Very good  
3 = Good  
4 = Average  
5 = Poor  
6 = Very poor |
<table>
<thead>
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</thead>
<tbody>
<tr>
<td>DAY 1</td>
<td></td>
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<tr>
<td>DAY 2</td>
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<tr>
<td>DAY 3</td>
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<tr>
<td>DAY 4</td>
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</tr>
<tr>
<td>DAY 5</td>
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</tbody>
</table>

If you broke the walking down into two sessions of 15 minutes, record each time you went out but in the same day's box.