UK evaluation of family-based behavioural intervention for paediatric obesity

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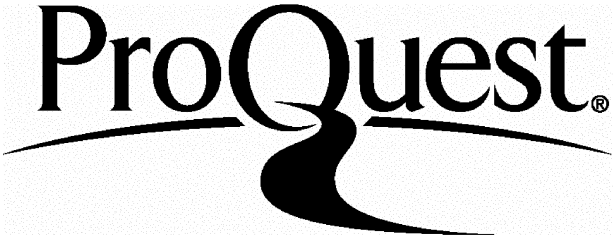

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ABSTRACT

The prevalence of childhood obesity has risen dramatically in recent years, yet little is known about effective intervention. Family Based Behavioural Treatment (FBBT) has been shown to be amongst the most effective treatments in the US, but has not been evaluated in the UK. The aim of this study was therefore to examine the impact of FBBT within a UK setting. Changes in %BMI were assessed at completion of and at three months post intervention. Furthermore, the effect of treatment on mood, self-esteem, self-perception of physical appearance, general difficulties and eating attitudes was examined. Factors targeted for change by the intervention including parental feeding style, diet and eating behaviour as well as activity levels were also evaluated.

Obese children aged 8 – 12 years old were recruited through health professionals and the media. In total 65 children were referred for intervention, of which 37 were invited for assessment. Of these, 33 met eligibility criteria for the study and were assigned in order of presentation to one of 4 consecutive treatment groups. Furthermore, 6 of these children were assigned to a 3 month no intervention control group before commencing treatment. Children attended for FBBT together with at least one parent for 10 weekly sessions, followed by 2 fortnightly sessions and a follow-up session 3 months later. The intervention was based on the Stop Light Diet as described by Epstein and colleagues in the US.

Changes in outcome variables were compared between the start and end of treatment as well as between the end of treatment and three month follow-up. Furthermore, changes in degree of overweight (%BMI) during the no intervention control period was compared to the intervention period. Results suggested that there was a significant reduction in %BMI at the end of treatment, which was maintained at follow-up. No

change in %BMI was observed during the control period, suggesting that changes reported on completion of the intervention can be attributed to FBBT. Furthermore, there were significant improvements with respect to diet, levels of activity and sedentary behaviour, psychological functioning and parental relationship to child's eating, which was maintained or further improved on at follow-up. No increase in eating pathology was observed. Furthermore, treatment gains made with respect to consumption of food high in fat and sugar were not maintained. With respect to eating behaviours, eating in response to external cues (food responsiveness) significantly decreased at the end of treatment, whereas regulating food intake in response to internal cues (satiety responsiveness) significantly increased. In contrast, eating in response to emotional cues (emotional over- and undereating) did not change at the end of treatment. These finding were maintained at follow-up. The present findings suggest that FBBT was an effective and feasible treatment for childhood obesity in this study and would benefit from replication with a larger, randomised sample.

CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

The prevalence of childhood obesity has risen dramatically in recent years to the extent that The World Health Organisation has declared obesity a global epidemic (WHO, 1998). Childhood obesity has been associated with risks to health and psychological well-being, often continuing into adulthood, yet, little is known about successful treatment for obese children. Family-based behavioural treatment (FBBT) appears to have the most promising outcomes at present and is the most well established treatment for paediatric obesity in the United States.

Although FBBT has been shown to be effective in the US, it has as yet not been evaluated within a UK population. The aim of this study is to assess the impact of FBBT for childhood obesity in a clinical setting in Britain. As little is known about the impact of such interventions on psychological functioning a further aim of this study is to examine changes in psychological variables such as mood and self-esteem in greater detail. Eating attitudes will also be examined as there has been some concern between the link of dieting and the development of eating disorders, which needs to be taken into account in the development of obesity treatment.

This introduction outlines the definition and prevalence of childhood obesity. Risks to health and effects on psychosocial functioning are then summarised. In addition, factors contributing to the onset and maintenance of childhood obesity including

medical causes, genetic factors, social and familial variables, parental feeding style, eating style, diet, physical activity as well as environmental factors are explored. An outline of availability of treatment in the UK is then presented. Finally, a description of the components of FBBT including behaviour modification, exercise, diet and inclusion of family is given together with a review of the evidence base concerning FBBT. This is followed by a rationale for the current study and the hypotheses.

1.2 EPIDEMIOLOGY OF PAEDIATRIC OBESITY

1.2.1 Definition of obesity

Classification of overweight and obesity for adults is commonly carried out according to body mass index (BMI) as recommended by the World Health Organisation (WHO, 1998). BMI is calculated by dividing weight (kg) by height squared (m^2). BMI is widely accepted as providing a convenient measure of a person's weight status. It gives an index that is broadly independent of height and equally applicable to men and women (Prentice, 1998). For adults a BMI between 18.5 and 24.9 falls within the healthy range. A BMI of 25-29.9 falls within the overweight range and an individual with a BMI of 30 and above would be considered obese.

Classification for children is less clear as the 50th centile for body mass index changes from birth through to early adulthood (Prentice, 1998). In the UK, the British charts for body mass index spanning birth to 20 years, are most commonly used (Child Growth Foundation, 1990). These charts are based on findings by Cole and colleagues (Cole, Freeman, & Preece, 1990) who adjusted the body mass index distribution for differing degrees of skewness at different ages. They are particularly

useful for clinical purposes as they are less affected by differences in the timing of puberty than simple height and weight charts. Cole and colleagues (Cole, Bellizzi, Flegal, & Dietz, 2000) recently published international guidelines based on the standard definition of BMI, which have been recommended by the International Obesity Task Force (IOTF). These criteria suggest cut-off BMI's for childhood overweight and obesity which pass through 25 kg/m^2 and 30 kg/m^2 at age 18 respectively, and can be used to index obesity in children.

A method sometimes used to accompany BMI is the measure of skinfold thickness. This is an assessment of subcutaneous fat, usually taken on the front and back of the upper arm, on the back beneath the shoulder blade and above the hip. Although this provides a specific measure of fat in the body, there are no standard definitions and classifications of childhood obesity available for this measure. Furthermore, it is a time consuming assessment requiring trained staff and can at times be an inaccurate measure (Measuring Body Fat, ORIC, 1997).

A further assessment of adiposity is that of waist circumference. It has been shown that the circumference of the waist relates closely to body mass index and reflects the proportion of body fat located intra-abdominally, as opposed to subcutaneously in adults. Furthermore, waist circumference is a reliable indicator of changes in intra-abdominal fat during weight loss in adults, (Lean, Han & Morrison, 1995). However, Wells (2001) argued that the use of waist circumference as a measure of adiposity is limited as it is not an absolute measure of fat mass because it does not take into consideration lean tissue deposition. Furthermore, norms on the use of waist circumference with children are not presently available.

1.2.2 Prevalence and epidemiology of obesity

The prevalence of obesity amongst adults is rising at an alarming rate in both developed westernised and less developed countries around the world. This increase has been mirrored amongst children. According to the International Obesity Task Force (IOTF), the prevalence of adult obesity has increased by about 10-50% in the majority of European countries in the last 10 years (International Obesity Task Force, 2004).

Levels of overweight and obesity amongst 7 – 11 year olds in the UK have increased threefold since 1984 (Lobstein & Frelut, 2003). This increase is of particular concern because childhood obesity tracks into adulthood and obesity in adolescence is directly associated with increased morbidity and mortality in adult life, independent of adult weight (Rudolf et al., 2001).

Based on the Health Survey for England, 1998 (Lobstein, James & Cole, 2003), the most recent data available, one child in twenty-five is obese and one child in five aged 5 -17 is overweight in England. Recent findings of the National Health and Nutrition Examination Survey (NHANES) suggest that more than 15% of children and adolescents aged 6 – 19 and more than 10% of children aged 2 to 5 are obese in the US (Ogden, Flegal, Carroll & Johnson, 2002).

Obesity in childhood is known to be an independent risk factor for adult obesity (Parsons, Power, Logan & Summerbell, 1999; Whitaker, Wright, Pepe, Seidel & Dietz, 1997). Whitaker et al (1997) reported that whilst parental weight status is the main factor predicting whether overweight toddlers will become overweight adults, in children over the age of 10 years old, child's own weight status has more predictive value for adult obesity. It should be noted however that, although many

obese children continue to be obese in adulthood, not all obese adults were obese during childhood (Zametkin, Zoon, Klein & Munson, 2004).

NHANES revealed that there are marked differences amongst children of different ethnic backgrounds. African-American girls were found to have the highest rates of obesity and non-Hispanic Black and Mexican-American adolescents showed the biggest increase in levels of obesity since 1988. However, little is known at present about cultural and racial influences on the prevalence of childhood obesity and further research is needed to fully explore these issues.

Findings on gender differences in childhood obesity are conflicting and Lobstein and Frelut (2003) in a review of prevalence data from 21 surveys in Europe found that the number of countries reporting girls to have greater prevalence was equal to the number of countries reporting boys to have greater prevalence. Chinn and Rona (2001) reported that girls in England aged 7-11 have higher levels of excess weight (overweight and obesity combined) than boys (23.6% vs. 17%). Obesity in women from social class V is double than those in social class I. Obese children, too, are more likely to come from lower socio-economic backgrounds (Department of Health, 2004).

In summary, despite there still being no universally accepted way of assessing overweight and obesity in children, no-one disputes that the prevalence of obesity has dramatically risen in recent years. Cultural variations have been found with children from some ethnic minorities as well as children from lower socio-economic backgrounds being more likely to be obese. Conversely gender differences amongst obese children appear to be less clear cut. Furthermore, obesity in childhood increases the risk of obesity in adulthood. The increase in the prevalence of

childhood obesity is of particular concern due to the link between degree of overweight and medical co-morbidity, which will now be examined in more detail.

1.3 ASSOCIATED DISORDERS OF PAEDIATRIC OBESITY

Childhood obesity affects an individual's health-related quality of life in a number of ways, including physical health and psychological functioning. Whilst some of the consequences of excess weight during childhood develop concurrently with weight gain, many manifest only later in life.

1.3.1 Effects on health

Childhood obesity has been associated with numerous medical difficulties in children. Compared to normal weight children, obese children are twice as likely to suffer from cardio-vascular disease and hypertension (Dietz, 1997). Childhood obesity has also been linked to increased levels of type II diabetes, sleep apnoea which may lead to clinically significant decrements in learning and memory function, orthopaedic difficulties, hypercholesterolemia and hypertension, all of which may seriously affect the individual's quality of life (Gidding, Bao, Srinivasan & Berenson 1995; Pinhas-Hamiel, Dolan, Daniels, Sinha, Fisch & Teague, 2002; Silvesti, Weese-Mayer, Bass, Kenny, Hauptman, & Pearsall 1993; Srinivasan, Bao, Watigney & Berenson, 1996; Standiford, Khonry & Zeitlerm 1996; Strauss, 1999).

Not only can childhood obesity have immediate effects on an individual's health, but it appears to have long-term consequences, too. Zametkin et al (2004) cite evidence from the Harvard Growth Study of 1922 to 1935 by Strauss (1999). This showed that

the mortality rate from cardiovascular disease in adulthood of obese boys aged 13 to 18 doubled compared to non-obese boys. Furthermore, being obese as an adolescent was a better predictor of overall mortality than being obese as an adult. Moreover, being obese during adolescence increases the risk of obesity tracking into adulthood (Power, Lake & Cole, 1997; Wright, Parker, Lamont & Craft, 2001) and therefore brings with it the associated health risks of obesity including cardiovascular disease, diabetes, joint trauma, back pain, cancer and increased mortality (World Health Organisation, 1998).

In addition to the effects on physical health, psychological functioning may also be affected.

1.3.2 Effects on psychosocial functioning

A number of psychosocial factors including self-esteem, mood, behavioural difficulties and eating attitudes have been linked to obesity. Although, these issues have been examined within the adult population, only a small body of research exploring these variables within the obese child population is available. Where there is a paucity of such studies, literature concerning obese adults will therefore be considered in the following. Although it has to be born in mind that there may be differences in the relationship between psychological well-being and obesity between adults and children, studies carried out with adults may nevertheless have implications for the obese child population.

1.3.2.1 Self-esteem

One aspect of self-esteem which is particularly salient to the obese population is negative physical self-perception and body image, as it has been found that both these constructs occur more frequently with increased weight status (Braet et al, 1997; Wardle & Marsland, 1990). This is of particular concern as body-image dissatisfaction has also been linked to increased eating pathology (Thompson, 1995). Obesity in turn, poses a further risk factor for the development of eating disorders (see section 1.3.2.4 Eating Pathology). Obese children with a negative body image may therefore be at even greater risk of developing such symptomatolgy. However, the combination of these two risk factors has received little attention to date and further research is needed to explore a potential relationship.

With respect to overall self-esteem, it has been argued that obese children report a lower sense of general self-worth than non-obese children (Braet, Mervielde & Vandereycken, 1997). More specifically, Strauss (2000) found that the association of reduced self esteem with feelings of sadness, nervousness and loneliness is evident amongst obese children. In addition, he found that obese children with low self-esteem are more likely to be reporting such feelings than obese children with a positive self-image. Furthermore, those with low self-esteem are more likely to be engaging in high risk behaviours such as smoking or consuming alcohol during adolescence. This suggests that not only does obesity pose a risk factor for low-self esteem in children, but this in turn is associated with other psychological difficulties.

In contrast to these findings, other studies have reported no particular risk to self-esteem for those who are overweight (Kaplan & Wadden, 1986). These inconsistent

results may be due to the fact that the majority of research examining the link between self-esteem and obesity has tended to compare either treatment seeking or non-treatment seeking obese samples to a group of non-obese peers, rather than exploring the heterogeneity within the obese child population (see 1.3.2.5 clinical versus population based samples, below) (Braet et al, 1997, Strauss et al, 1985). An alternative way of interpreting such inconsistencies within the literature may therefore be to consider how some children's self-esteem is protected in the face of the widespread stigmatisation associated with being obese. Rather than treating obese children as a homogenous group, variability within the paediatric population needs to be understood.

1.3.2.2 Mood

Paediatric obesity has previously been associated with increased levels of depression (Wallace, Sheslow & Hassink, 1993). Epstein and colleagues (Epstein, Valosky, Wing & McCurley, 1994) reported that 11.6% of children attending for paediatric obesity treatment display clinical levels of depression. This is considerably higher than levels of childhood depression in community samples which have been reported as ranging from 0.5 –2.5% (Carr, 1999). Roberts et al (2003) carried out a longitudinal study assessing the relationship between obesity and depression in a group of obese adults, with assessment being carried out at baseline and 5 year follow-up. They found that obesity status was an independent predictor of increased risk of depression at five year follow-up, even after controlling for mood at baseline. However, depression at baseline did not predict increased risk of future obesity. This suggests that obesity may lead to depression, but depression is unlikely to lead to increased weight. In contrast to this, Stunkard and colleagues (Stunkard, Faith &

Allison, 2003), found that depression in adolescence was linked to increased risk of obesity in adulthood. Therefore, although there appears to be a link between increased weight status and low mood, the cause–effect relationship mediating this is not clear. Stunkard et al (2003) suggest that amongst other factors, adverse childhood experiences may promote the development of both and account for their co-occurrence.

1.3.2.3 Behavioural Difficulties

Recent research suggests that there is a link between childhood obesity and behavioural difficulties (Mustillo, 2003). More specifically, obese children seeking treatment are more likely to have behavioural difficulties as reported by their parents than obese children who are not help-seeking (Wadden & Stunkard, 1993). This is supported by Epstein et al (1994) who carried out a study evaluating efficacy of paediatric obesity treatment. He found that 29% of obese children in the study met clinical levels of behavioural difficulties, which is higher than a prevalence of 20% reported for the general population (Graham, 1991). Little is known about how obesity is linked to behavioural difficulties, but Epstein (1994) found that such difficulties were related to parental psychological distress rather than child weight status. One possible reason for this may be that parents who perceive their children to have difficulties may be more likely to seek support from health professionals in general. An alternative explanation may be that children who have behavioural difficulties are more likely to share factors associated with increased likelihood of obesity such as lower socio-economic status. This is supported by the fact that, although obesity and behavioural difficulties have not been examined jointly in relationship to such additional variables, lower socio-economic status has

independently been linked to both (Department of Health, 2004; Graham, 1991. p197).

1.3.2.4 Eating Pathology

Obese children have been found to be engaging in behaviours related to eating disorders such as binge-eating. The probability of an obese child displaying such behaviour increases with weight status (Decaluwé & Braet, 2003). Wadden & Stunkard (1993) explain that one of the mechanisms by which obese individuals develop behaviours consistent with eating disorders is through continued dieting. Support for this theory comes from studies in the adult population. Agras & Telch (1998) for example, reported that dieting in the form of reducing calorie intake resulted in increased binge-eating in overweight women, but not women of normal weight. Presnell & Stice (2003) explain that reliance on cognitive control over eating rather than physiological cues, leaves the dieter vulnerable to uncontrolled eating when cognitive control is interrupted or when dietary rules are violated. These binge-eating episodes may in turn lead to increased dieting efforts of weight control techniques such as vomiting and laxative use, which may lead to bulimia nervosa. However, evidence for the link between dieting and the development of eating disorders is conflicting. Several studies have found that adults placed on low-calorie diets report decreased rather than increased levels of binge-eating (Godrick et al, 2001, Presnell & Stice, 2003). These findings suggest, that although some forms of dieting may lead to an increase in binge-eating, this link has not been replicated in other studies, and the binge-eating as a result of dieting may therefore depend on individual factors as well as the type of diet followed.

1.3.2.5 Clinical versus population based samples

Studies examining the prevalence of psychological difficulties in adults and children with obesity often yield conflicting results. Lee & Shapiro (2003) for example, observed that there appears to be conflicting evidence as to whether obese adults are more likely to be suffering from psychological difficulties than non-obese adults. Whereas some studies have found no differences or differences so small as not to be clinically significant in the adult population (Wadden & Stunkard 1993), other studies have linked obesity to higher incidence of psychological dysfunction, including higher rates of anxiety disorder, affective disorder and somatoform disorder (Becker et al 2001). One possible reason that may explain these conflicting findings is that there may be a difference with respect to psychological difficulties within the obese population. Specifically there is a difference between obese individuals presenting for treatment and non-clinical samples. Wadden & Stunkard (1993) reported that studies carried out with clinical samples of obese adults are more likely to find increased level of psychological difficulties than studies carried out in population settings. One of the reasons for this may be that obese individuals with psychological difficulties may be more likely to present for treatment due to their generally raised level of distress.

One of the main difficulties in ascertaining whether raised levels of psychological difficulties reported in clinical samples reflect the obese population in general, is the lack of a control group in most studies (Wadden & Stunkard, 1993). Psychological distress is reported by most treatment seeking individuals regardless of the specific disorders, and it can therefore not be concluded that elevated levels within the

treatment seeking obese population are representative of the obese population in general.

1.3.2.6 Cause and Effect

Although it has been established that there is a link between psychological distress and weight status in some obese individuals it is not clear whether weight status is the cause or effect of distress. It used to be thought that obese individuals overeat in response to negative emotions such as frustration, sadness and insecurity, using eating as a coping mechanism in the absence of other comforts (Wadden & Stunkard, 1993).

More recently however, thinking about obesity has shifted and there is now evidence to support the idea that psychological distress is a consequence of increased weight status. One of the reasons obese children and adults may be more likely to suffer from low self esteem and other psychological difficulties may be the level of discrimination they experience within society. Staffieri (1967) found that children as early as 6 years of age described silhouettes of an overweight child as "lazy, dirty, stupid, ugly, cheats, and lies". Richardson (1961) showed that both children and adults rate an obese child as one they would least like to play with when shown line drawings of obese children as well as those of children with a disability including missing hands and facial disfigurement. Those who are overweight themselves shared this response. Latner & Stunkard (2003) confirmed these findings and added that increased weight status is linked to greater levels of stigmatisation.

Lee & Shapiro (2003) suggest the possibility of a third, independent factor explaining the co-morbidity of obesity and psychological difficulties, such as a personality trait, which may account for both. As yet, there is little evidence available to support this idea and further research is needed to explore the link between personality variables and obesity.

1.3.3 Summary of associated disorders of paediatric obesity

In summary, childhood obesity has been associated with a number of adverse effects on health, increased likelihood of being an obese adult, and increased adult mortality due to cardio-vascular disease. Childhood obesity has also been associated with psychological difficulties including increased risk of low self-esteem, low mood, behavioural difficulties and eating disorders. This may partly be explained by the prejudice and negative attitudes obese individuals are exposed to in society. Factors leading to the onset and maintenance of childhood obesity will now be examined in more detail.

1.4 FACTORS IMPLICATED IN CONTRIBUTING TO THE ONSET AND MAINTENANCE OF PAEDIATRIC OBESITY

Obesity is a process that occurs gradually over a period of continuous weight gain. Weight gain takes place when the amount of energy consumed as food and drink (measured in calories or kilojoules) exceeds the amount of energy used for exercise and other metabolic processes in the body. This excess energy is stored as fat. When more energy is consumed than required by the body an individual is considered to be in an 'energy positive state'.

Although there is currently no evidence for any single cause of weight gain and obesity, a number of factors, including medical, genetic, diet, social and lifestyle variables have been implicated in contributing to the onset and maintenance of obesity. The rapid increase within a generation provides opportunity to speculate about some environmental effects.

1.4.1 Medical causes

Medical variables which may affect a child's likelihood of developing obesity are varied and start as early as the neo-natal period. For example, Styne (2001) found that mothers who have gestational diabetes are 50% more likely to have children who develop childhood obesity.

Deviations from normative development, too, have been linked with childhood obesity. For example, adiposity rebound, which is "the increase of BMI that occurs after the normal decrease in adiposity between infancy and approximately age 5 to 7" (Zametkin, 2004) has been found to be a predictor of childhood obesity when it occurs before the age of 5 (Styne, 2001). Early maturation, too, appears to pose an increased obesity risk. However, the mechanism by which these factors affect weight are not understood at present.

Rare medical conditions are a further factor which can lead to an increased risk of childhood obesity. These include hormonal causes such as hypothyroidism, hypercortisolism and primary hyperinsulinism as well as genetic syndromes such as Prader –Willi Syndrome and Turner Syndrome (Zametkin et 2004). However, such

disorders account for excessive weight gain in less than 10% of obese children (Moran, 1999). Therefore, the role of other factors such as genetic and familial variables, activity levels and diet need to be examined in more detail.

1.4.2 Genetic factors

Genetic variables are likely to play an important role in the onset and maintenance of obesity. Twin studies have shown that identical twins reared apart are more alike in weight status than non-identical twins reared together (Ogden, 2003). Other twin studies have shown that as much as 66-70% of the variance in body weight can be accounted for by genetic factors (Stunkard et al., 1990). Further support for the link between genetics and obesity comes from studies examining weight in adopted children. Stunkard et al (1986) reported that there was a strong relationship between adoptee's weight status and their biological parents' weight status, but not with their adoptive parents' weight status.

Although the hypothesis that weight is largely determined by genetic variables has been well supported, little is known about the mechanism by which genetic components lead to actual weight gain. Ogden (2003), suggested that metabolic rate, number of fat cells and appetite regulation may all be affected by genetic factors, but there is little research to date exploring such relationships.

1.4.3 Environmental factors

In addition to the factors mentioned above, the rapid increase in childhood obesity within a relatively short period of time has been linked to recent environmental changes, including a higher calorie intake combined with lower levels of activity

(Kaur, Hyder & Poston, 2003). Poston & Foreyt (1999) cite factors such as labour saving devices and increased use of physical transport, reducing the need for physical activity as well as increased sedentary past-times such as television viewing and playing computer games as the main environmental contributors to increased obesity levels. They argue that readily available unhealthy food choices and increased portion size further contribute to this. Poston & Foreyt (1999) argue that there is a genetic mismatch between the environment we live in and our physiological need for energy intake and expenditure. Recent changes in westernised cultures have therefore led to environmental circumstances which promote the development of obesity. This has been termed the obesogenic environment (Poster & Foreyt, 1999). This suggests that although specific factors are linked to weight status in individuals, environmental changes have led to the generational increase and maintenance of obesity.

1.4.4 Social and familial factors

Although it is not always apparent whether increased incidence of obesity within families is due to environmental or genetic variables, there is a considerable body of evidence suggesting that there is a link between parental weight status and child weight status. In fact, parental weight appears to be one of the main predictors of adult obesity for children. Whitaker (1997) reported that both obese and non-obese children have twice the risk of adulthood obesity if they have at least one obese parent. Moreover, the increased incidence of obesity in children of obese parents have long-term effects as 80% of obese children who have at least one obese parent will remain obese in adulthood (Whitaker, 1997).

Food preferences are a further area which may be affected by familial factors. Although genetics may affect such preferences, it is likely that socialisation, too, plays a significant role in establishing nutritional habits in children. Ebbeling et al (2002) for example, reported that children as young as 3 exhibit a preference for high fat foods if their parents are obese. Children who are consistently exposed to high fat diets, both through observing their parents' diet and by having a high fat diet provided for them by their parents are likely to develop an increased preference for such foods.

Other social factors associated with an increase in the prevalence of childhood obesity include neglect, abuse and a non-supportive home-environment (Strauss 1999). Furthermore, obese children are likely to have fewer years of education and come from families with lower family income, higher poverty rates and lower marriage rates (Lee & Shapiro, 2003; Zametkin, 2004). Data from the UK 1958 Birth Cohort Study shows that for boys from non-manual backgrounds only 18% of obese 7 year-olds remain obese aged 23, compared with 31% from manual classes. Similarly in obese girls, 22% from non-manual compared to 39% from manual backgrounds are still obese aged 23, (Childhood Obesity, ORIC, 1997).

Although it is not clear how these individual factors contribute to obesity, Parsons et al (1999) suggest that one possible explanation may be that children exposed to adversity use food to provide comfort, and eating therefore serves as a compensatory mechanism (Zametkin, 2004). A further explanation may be that families affected by adversity may not have the personal and financial resources to prioritise a nutritious

diet with respect to other family needs. In addition to social factors, changes in dietary habits have been implicated with the current rise in levels of obesity.

1.4.5 Parental Feeding Style

Parental feeding styles are a further factor which have been linked to childhood obesity (Robinson, Kiernan, Matheson Haydel 2001; Wardle, Guthrie, Sanderson & Rapoport, 2001). Evidence for this has come both from obese adults relating their maladaptive eating styles to eating habits acquired during childhood (Bruch et al., 1981, Rand & Stunkard, 1977, Brink et al., 1999 in Wardle et al., 2001) as well as from studies examining the link between the family feeding environment and childhood obesity (Hecker, Martin & Martin, 1996, Baughcum et al., 1998 in Wardle et al., 2001).

Specifically, Wardle et al. (2001) proposed that feeding in response to emotional distress (emotional feeding) and using food as a reward (instrumental feeding) are associated with overeating. This may occur because such feeding styles encourage eating in response to external cues rather than hunger, and may therefore lead to overeating. Wardle at al. (2001) further proposed that parental encouragement to eat, which may stem from the belief that a heavier child is a healthier one, may be linked to increased weight status. Control over eating and restriction of high fat foods on the other hand, may reduce the likelihood of overweight. However, there is little research exploring these constructs in relation to child weight status.

One study which did examine the effects of parental control over eating was carried out by Robinson et al (2001). In this study parental feeding style was assessed via a

telephone survey of parents of third grade children, and the relationship to child weight status was explored. Robinson found that increased parental control over eating led to decreased levels of overeating in girls, but not boys. This further supports the idea that parental control over eating may regulate food intake. Although there is some support for the link between parental feeding style and obesity, little is as yet known about the mechanism by which such factors affect eating.

1.4.6 Eating style

It has been suggested that a number of eating styles may be linked to increased weight status. In particular, eating in response to emotional cues has been linked to obesity. Kaplan & Kaplan (1957) proposed the psychosomatic theory of obesity. According to psychosomatic theory obese people overeat when they are anxious, as eating may reduce anxiety. They further hypothesised that in some obese individuals negative emotions are temporarily diminished whilst eating. These individuals therefore have consequently become unable to distinguish between hunger and anxiety as they have learnt to eat in response to both. Therefore eating to reduce anxiety may lead to overeating and obesity. How eating reduces anxiety is not clear, although it may be due to learned behaviour as well as differential effects of protein and carbohydrate intakes affecting brain neurotransmitters, in particular serotonin (Canetti, Bacher & Berry, 2002).

A number of studies have supported the link between increased levels of emotional eating and obesity (Canetti et al, 2002, Geliebter & Aversa, 2003). Furthermore, overeating appears to occur more frequently in response to negative emotions such as

sadness or anger than in response to positive emotions (Geliebter & Aversa, 2003). As a result of this it has been argued that emotional eating should specifically be addressed in obesity management (Booth, 1999).

1.4.7 Diet

In addition to changes in activity levels, diet is likely to be one of the most important factors implicated in excess weight gain, as excess calorie intake results in the storage of body fat and ultimately leads to excess levels of fat in the body (Davison & Birch, 2001). Davison & Birch (2001) point out that there appears to be some discrepancy within the literature, as increased energy intake has not consistently been linked with increased weight status in children. They suggest that this may be due to differences in measurement of energy intake.

In fact it has been argued that the majority of surveys carried out are likely to under-estimate the number of foods containing fat and sugar being consumed. It has been shown that an increasing number of meals are now taken outside the home. Such meals are more likely to be high in fat and sugar, but are often not reported in food surveys, as only foods eaten inside the home are considered as 'meals' by participants (ASO, 2000).

There does appear to be a clear link between increased intake of high energy density foods, such as fat and sugar, and weight status (Gillis, 2002). Although, it has long been thought that high-fat meals increase satiety and suppress appetite, this does not appear to be true. Stubbs et al (1994) for example, reported that adults presented with two similar meals, one of which is rich in fat, eat a similar amount of food regardless

of the fat content, therefore consuming a meal higher in calories. Higher intake of fat in children has been linked to higher percentage body fat, fat mass and skinfold thickness as well as greater increase in BMI (Davison & Birch, 2001). Government guidelines on nutrition state that fatty and sugary foods should be eaten sparingly, "that is in infrequently and/or in small amounts" (Balance of Good Health, Health Education Authority, 1994). Yet, it has been found that up to 37% of a typical UK diet now consists of fat, which would support the notion that a change in diet has contributed to an increasing number of children being overweight.

Sugar is likely to be a further factor leading to excess weight gain. The diet of children between the ages of 4 and 18 now consists of 17% of sugar, compared to the recommended average of no more than 11% (National Diet and Nutrition Survery, 2000), thereby leading the consumption of additional energy. Carbonated soft-drinks in particular, have been identified as significantly contributing to increased weight status if consumed regularly. Hamack et al (1999) carried out a study assessing schoolchildren's consumption of carbonated drinks containing sugar and found that regular consumption of soft-drinks increased average daily energy intake from 7650 kj to 8435 kj.

This increase in energy consumed through sugar-sweetened drinks has been found to be directly related to increase in BMI and frequency of obesity independent of anthropomorphic, life-style, demographic and other dietary variables. (Ludwig et al 2001). This further supports the notion that diet is a major factor affecting weight status.

It has generally been acknowledged that the study of diets and particularly children's diets is very difficult as it commonly involves the use of food diaries (Atkinson & Nitzke, 2001). Keeping a reliable and accurate food diary can be extremely difficult for children and over- or under-reporting of consumption of certain foods as a result of social desirability effects is a further difficulty with assessing children's food intake reliably.

In summary, although increased energy intake has not consistently been linked to increased weight status, diet is likely to be a main factor in the onset and maintenance of obesity. In particular, increased consumption of fatty and sugary foods have been linked to weight gain and adiposity. However, reliable assessment of food intake remains a difficulty within the study if dietary habits.

1.4.8 Activity levels and sedentary behaviour

As the levels of obesity have risen, activity levels have greatly decreased amongst children in recent years (Kim et al 2002). Government recommendations state that children should be exercising, at moderate intensity, for an hour each day (Corbin et al., 1998).

Although there are no recent data on current activity levels of children in the general population, it is unlikely that targets set by the government are met. This is supported by Janz et al (1992), who reported that pubertal and post pubertal children spend as little as between eight and ten minutes per day in aerobic activity. As weight gain is a function of energy intake (through diet) being greater than energy expenditure (through activity and exercise), reduced activity levels are likely to be implicated in

excessive weight gain. Lower levels of activity in children have been associated with higher BMI, greater skinfold thickness, greater fat mass and obese status (Davison & Birch, 2001).

In addition, to low levels of physical activity, children are now spending increasing amounts of time engaged in sedentary behaviours such as watching TV and in front of the computer. US children for example, watch an average of between 3 and 5 hours of TV per day (Tucker & Friedman, 1989).Watching more than 3 hours of TV per day has been associated with increased risk of obesity in adults (Tucker & Friedman, 1989) as well as children (Proctor et al, 2003). Davison & Birch (2001) reviewed a number of studies concerned with sedentary behaviour in children and reported that a greater number of hours spent in sedentary pursuits has been associated with higher prevalence of overweight, higher BMI and greater skinfold thickness. Therefore, lack of exercise and an increase in sedentary behaviour is likely to be a major factor contributing to the present obesity epidemic.

One of the mechanisms through which the increase in obesity is linked to reduced activity levels is that sedentary behaviour such as watching television (TV), which have increased in recent years (Tucker & Friedman, 1989) is incompatible with being active. This would therefore lead to reduced energy expenditure through activity. Furthermore, by watching TV children are exposed to a vast number of adverts, including adverts for sugary and fatty foods. This in turn may contribute the increased consumption of such foods, which will lead to weight gain. In addition to this snacking whilst watching TV has been linked to increased energy intake. Support for this theory comes from Gore et al. (2003) who found that in adult

women, snacking whilst watching TV is associated with increased overall caloric intake and calories from fat.

1.4.9 Summary of factors implicated in the onset and maintenance of childhood obesity

In summary, there are a number of factors implicated in the onset and maintenance of childhood obesity. Medical issues such as gestational events, early maturation and to a lesser extent rare medical disorders have been linked to the onset of obesity. Genetic and familial variables such as increased parental weight, poor family dietary habits and low social economic status pose a further risk for children to become obese. Parental feeding styles and eating styles which lead to eating in response to external rather than hunger cues, may lead to overeating and therefore further contribute to weight gain. In addition to this, decreased activity levels and increased amount of time spent in sedentary pursuits are likely to be implicated. In spite of difficulty in assessing dietary habits reliably, the increased consumption of high energy density foods, in particular foods high in fat and sugar pose a further risk factor for the development of obesity. Finally, environmental factors contribute to the increase of obesity on a societal level. The events leading to the recent rise in childhood obesity are clearly varied and complex, and this has to be taken into consideration in the development of effective approaches to the treatment of paediatric obesity. Several of these approaches will now be examined in more detail.

1.5 TREATMENTS FOR PAEDIATRIC OBESITY

1.5.1 Availability of treatment in the UK at present

Decreasing the rates of obesity in children and adolescents has been identified as a national health care priority in a number of westernised countries including the US and the UK (NHHS, 1991, DOH, 2004)). Yet a recent publication by the government concedes that services for obese children are limited at present (Specialised Services National Definitions Set (2nd Edition), 2004). Although exact figures documenting availability of specialised paediatric obesity services are not available, anecdotal evidence suggests that there are few such services in place at present. Even within services specialising in eating disorders and feeding difficulties the assessment and treatment of obese children is rare. A recent survey of such services for children aged 0 – 18 in England & Wales showed that only 20 out of 74 services would feel able to see children with obesity (Great Ormond Street National Map Project, 2004, personal communication).

It is further acknowledged, that as drug or surgical treatments are currently not available and possibly not suitable for children, treatment aimed at lifestyle changes (activity & diet), including the family need to be developed further. Although such treatments have been evaluated in the US (Epstein, 1998), these have not been assessed on a UK population as yet, and therefore do not meet Chambless criteria. According to these criteria (Chambless & Hollon, 1998), psychological treatment can not be considered to be established in efficacy until it has been evaluated in more than one clinical setting and with various populations. The government has recognised the need for early referral to specialised services in treating pediatric

obesity (Specialised Services National Definitions Set (2nd Edition), 2004) and evaluation of effective outcomes is therefore a priority.

As it has generally been recognised that the treatment of childhood obesity needs to address both diet and activity levels, the majority of treatments have combined these two factors in various ways. However, there is only a small body of research which examines attempts to treat childhood obesity by targeting either diet or activity levels only.

1.5.2 Treatments aiming to change activity levels

Activity levels may be changed either by increasing physical activity, decreasing sedentary behaviour, or a combination of both. Interventions targeting reductions in sedentary behaviour have generally shown improved weight status as a result. One study aiming to reduce sedentary behaviour to achieve weight loss tried to change a traditionally sedentary behaviour (watching TV) into exercise. Faith et al (2000) carried out a study in which ten obese children were randomised into two groups. For the experimental group, watching TV was made contingent on pedalling a stationary cycle ergometer, whilst for the control participants it was not. They found that not only did children in the experimental group watch significantly less TV (1.6 hours compared to 21 hours per week) than the children in the control group, but they also had a significant reduction in total body fat. This suggests that making a potentially sedentary behaviour contingent on physical activity reduces time spent in sedentary pursuits as well as leading to improved physical health. In another study Epstein (1997) reported that when children were given reinforcement for reducing the number of hours spent watching TV, it was found that physical activity levels

increased even when this had not been specifically targeted. This suggests that reinforcing a decrease of sedentary behaviour may be associated with increased activity levels.

Epstein (1985a) carried out research aiming to identify differences in weight loss with respect to different types of increased activity and exercise. He compared the effects of lifestyle exercise (e.g. walking), aerobic exercise and low intensity callisthenics on weight status. Epstein (1985a) reported that lifestyle exercise was significantly superior at achieving weight loss than aerobic exercise, both following the intervention and at 24 months follow-up. It was also superior in maintaining weight-loss at 24 months follow-up compared to callisthenics. Both, aerobic and lifestyle exercise were significantly superior to calisthenics at 10 year follow-up in maintaining weight loss (Epstein, 1994). This supports the idea that increasing lifestyle activity is an effective way of achieving weight loss. Although there is sufficient evidence that both increasing lifestyle activity levels and decreasing sedentary behaviour are effective in achieving weight loss, it remains unclear whether one is superior to the other (Summerbell et al 2003).

1.5.3 Treatments aiming to change diet

Treatments of obesity which use diet as the main mechanism of change, aim to reduce the calorie intake of the individual. Where weight loss rather than weight maintenance is the aim, diets are designed to create an energy imbalance whereby more energy is expended than consumed. Few studies examining the effect of dietary restriction alone on weight status in children have been carried out. This may be due to concerns about encouraging children who have not completed growth to diet, as

nutritional deficiencies may have adverse effects on growth and development (Salooje, 2004).

One study which did examine the effect of dietary restriction was carried out by Bailes et al., (2003). In this study, participants were randomly assigned either to a carbohydrate restricted diet or a calorie restricted diet. They found that children were more successful in losing weight and showed higher compliance when following the carbohydrate restricted diet. They argue that this may be due to children on this diet experiencing an increase in satiety, as amount of food eaten here was not restricted. However, no long-term follow-up data is available to assess whether such gains were maintained.

In light of the number of factors contributing to obesity it is likely that treatments combining diet with increased activity will be more effective than diet alone. For example, Epstein (1985b) carried out an intensive 8-week treatment programme for paediatric obesity in which 20 girls were assigned to one of two groups: diet or diet plus aerobic exercise. He found that the combination of diet with exercise was more effective at achieving weight loss on completion of the intervention and at six months follow-up. However, at 12 months follow-up there was no significant difference between the two interventions. Schwingshanl (1999), also compared the efficacy of diet versus the combination of exercise and diet and found the combination of the two to be more effective at achieving weight loss. However, no long-term follow-up data is reported for this study. Considering the available evidence it would appear that the combination of diet and exercise is superior to diet

alone in the short-term, although evidence on long-term outcomes requires further research.

Recent developments in treatments for paediatric obesity have focused not only on the combination of diet and exercise, but have included the family as a vital agent for change.

1.5.4 Why is including the family important?

It has generally been accepted that the treatment of children with respect to psychological therapies greatly benefits from the inclusion of the family (Carr, 1999). The benefits of involving the family are twofold: firstly parents and siblings may act as a source of support and encourage the child in making changes to their lives, and secondly, family lifestyle may have been implicated in the onset and maintenance of the child's difficulties. By altering their own behaviours and responses family members will increase the child's likelihood of achieving change

With respect to the treatment of childhood obesity these two factors are particularly salient. As Caroli & Lagravinese (2002) observed, eating is deeply embedded within our social and cultural norms, including traditions and behavioural patterns within families. They further point out that food may play a role in many areas of family-life including being used functionally by parents to reward or comfort a child. Parents also act as role models to their children, not only with respect to diet, but also in areas such as exercising and carrying out physical activity (Johnson et al, 1994; Oliveria et al, 1994 reported by Sachiko et al, 2002). This would suggest that

parental inclusion as a primary agent of change in addressing children's eating and activity patterns is vital (Sachiko et al, 2002).

1.5.5 The Stop Light Diet/ Traffic Light Programme

Family-based behavioural approaches to the treatment of paediatric obesity have been researched extensively in the US over the past 20 years. A number of recent reviews evaluating the available research have concluded that family-based behavioural interventions have consistently been shown to be effective in achieving weight loss in obese children (Jelalian & Saelens, 1999; Sachiko et al, 2002, Epstein, 1998). One such programme is the 'Stop Light Diet' developed by Len Epstein and his colleagues.

The Stop Light Diet, a group based treatment, which for the purpose of this study has been renamed the Traffic Light Programme, is amongst the most well-established family-based behavioural interventions for paediatric obesity. In the studies described by Epstein treatment was delivered in weekly sessions for 8 – 12 weeks, with monthly meetings continuing for 6 – 12 months from the start of the programme. The main elements through which these components are delivered are behaviour modification, a calorie controlled diet and an increase of activity levels and reduction of sedentary behaviour, which will be examined in more detail in the following.

1.5.5.1 Behaviour Modification

The technique of behaviour modification is based on social learning theory. Social learning is comprised of operant conditioning, through reinforcement and

punishment as well as modelling (Bandura, 1977). According to this theory, a desired behaviour can be brought about or increased in a child through reinforcement, such as praise or rewards for instance as well through modelling the behaviour to the child. The Stop Light Diet incorporates these techniques by teaching these skills to parents and children. They are used in a number of ways including goal setting with respect to targets for exercise and reducing sedentary behaviour as well as diet. Children and parents then decide on suitable rewards to reinforce the desired behaviour. A further reinforcer that receives particular emphasis is praise. Principles of learning theory are also incorporated with respect to stimulus control. For example families were asked not to have any 'red' (foods high in fat or sugar) in the house as having such foods in close proximity increases the likelihood of eating them.

A vital part of the programme is that of modelling by the parents. It has been well established that children are likely to develop dietary preferences and activity patterns by observing their siblings and parents (Johnson & Birch, 1994; Sachiko et al, 2002). The Traffic Light Programme therefore aims to include at least one parent in the programme and asks that the entire family follows the advice on diet and activity. Parents are asked to teach the desired behaviours to their children through modelling.

1.5..5.2 Dietary components

The nutritional component of the treatment consists of regularisation of eating patterns and a calorie controlled diet. Healthy eating is taught to parents and children using the simple concept of a traffic light system. According to the Stop Light Diet foods are categorised into red (stop and think), yellow (approach with caution), and

green (go) foods dependent on their nutritional value and energy density. The aim is to reduce calorie intake to between 900 and 1200 kcal daily and increase nutrient density in the foods consumed (Epstein, 1994). Parents and children are asked to keep a daily food diary, which is reviewed on a weekly basis and behaviour modification techniques are used to encourage a balanced diet. Parents are taught how to calculate a child's ideal weight for height so that energy intake can be adjusted to allow for growth in the long-term.

1.5.5.3 Increase in activity and reduction of sedentary behaviour

The exercise component emphasises both, a reduction in sedentary behaviour and an increase in lifestyle activity. Epstein (1994) reported that the incorporation of lifestyle exercise is superior to callisthenics and aerobics in achieving weight loss, which is maintained at 10-year follow-up. Therefore activities such as walking which can be incorporated into the day-to-day life of the entire family are emphasised.

In a recent study Epstein (2000b) compared the effects of reducing sedentary behaviour and increasing physical activity on weight loss. He found that both methods were effective in achieving weight loss, and did not differ significantly in the amount by which overweight was reduced. Therefore, families are thought to be benefiting from a combination of both approaches and are encouraged to reduce sedentary behaviours, such as watching TV and playing computer games which either interfere with being active or act as cues for eating, as well as to increase their activity levels.

1.5.5.4 Inclusion of parents

The family environment changes include modifying the foods bought, stored, and served to the family and modifying modes of travel and leisure pastimes. Epstein (1994) has shown that non-obese status of the parent is associated with improved weight-loss in children by encouraging the parent to adopt a healthy life-style in the same manner as the child. Furthermore, in a study comparing a weight-loss programme including the parent with one where the child only was targeted, children attending with a parent decreased their percentage overweight by 15.3%, whereas children attending on their own increased by 7.6%. Therefore parents are included in the programme and encouraged to adopt a healthy life-style together with the child. Specifically, parents are encouraged to make family environment changes.

1.5.5.6 Evidence Base

Epstein has carried out extensive research on the effectiveness of this intervention and has consistently been able to demonstrate that the Stop Light Diet is effective in achieving weight loss in children. Average post-intervention weight losses are reported to be 17 % (Kazdin & Weisz, 1998).

Epstein and his team have published a series of studies which have manipulated various components of the intervention. According to Epstein (1996) the variables predictive of positive outcome include: the direct involvement of at least one parent in the programme, increasing lifestyle physical activity, improved eating environment and support for behaviour change from family and friends.

Maintenance and poor long-term outcome have been noted to be one of the major difficulties with treatments for obesity (Garner & Wooley, 1991 reported by Jelalian

& Saelens, 1999). Yet, follow-up of the Stop Light Diet at ten years post intervention shows that on average 30% of children reach non-obese status, whilst a further 34% reduce their percentage overweight substantially (Epstein, Kuller, Wing, Valoski & McCurley, 1994). Although it is likely that these reductions in overweight are at least partially attributable to the intervention, it has to be born in mind that no comparable data from a normal population sample on weight changes over this period are available.

In spite of the available evidence suggesting that children presenting for obesity treatment are more likely to be suffering from psychological difficulties, little research has been carried out to examine the effects of family-based behavioural treatments on psychological functioning in children. Levine et al (2000) carried out FBBT with children aged 8-12 years. Although they do not provide information as to whether children met clinical levels on any measures of psychological functioning, they report that both mood and state anxiety showed significant improvement between pre-treatment and follow-up (4-13 months post-treatment) as reported by the children. Furthermore, they found no change in disordered eating attitudes at follow-up compared to the start of treatment. The effects of treatment on eating attitudes in particular need to be examined in more detail as dieting has been associated with an increase in disordered eating attitudes (Wadden, 1993).

There are a number of limitations to the generalisability of findings reported by Epstein. Research on the Stop Light Diet has at present only been carried out with an American sample. Cultural differences between England and America with respect to parenting (Devereux, 1970) and eating behaviour and attitudes (Sachs, 1998

unpublished undergraduate thesis) have previously been documented. As these factors are vital components of the intervention, it can not be assumed that the efficacy of the programme demonstrated by Epstein can be generalised to a UK sample. In addition to this, participants in Epstein's studies have largely come from middle class socio-economic backgrounds and mainly included white or african-american families. This further limits generalisability of the findings. Therefore further research is required to examine whether the treatment is acceptable and effective within a British sample.

In addition to this, although a number of studies assessing the efficacy have been published by Epstein, they have all been carried out by the same research team within the same setting, which further limits generalisability (Summerbell et al., 2003). As mentioned above Chambless (1998), states that for psychological interventions to be considered established in efficacy, they need to be evaluated within more than one clinical setting. However, the studies described by Epstein have all been carried out within a research setting, and therefore need to be replicated with a clinical population. Furthermore, factors affecting the feasibility of this intervention such as staffing, client population and resources may differ between a research setting and a clinical setting. The feasibility of carrying out FBBT in a clinical sample therefore needs to be explored further.

1.6 RATIONALE FOR THE PRESENT STUDY

As outlined above, childhood obesity has dramatically increased in recent years and has been associated with a number of negative health and psychological effects.

Establishing effective and validated treatments for paediatric obesity is particularly important as weight loss has been associated with reduction of associated health risks in adults, and may also apply to children. In accordance with the emphasis on evidence based practice and clinical governance in the health service (Secretary of State for Health, 1997), it is generally acknowledged that interventions delivered within the health service need to be evaluated for efficacy and effectiveness. Yet, a recent review of available treatments for paediatric obesity carried out for the Cochrane library (Summerbell et al 2003) has concluded that at present there is limited quality data on the effectiveness of treatments for paediatric obesity, and in particular of specific treatment components.

In a review, Kazdin and Weisz (1998) suggest that there is interest not only in replicating the weight loss and physical health outcomes with this treatment model, but that there could be 'real value' in assessing whether improvements in psychosocial functioning accompany weight management in children.

The aim of this study is therefore to evaluate the FBBT described by Epstein and his colleagues in order to examine its effectiveness in a UK clinical setting. In addition to assessing the main outcome variable of weight change, other variables including children's self-esteem and mood will be also examined. Furthermore, as attempts at weight loss and dieting have previously been associated with increase in disordered eating behaviours, eating attitudes will be examined to ensure the programme has no adverse effects on participants. The maintenance of paediatric obesity intervention is a vital factor in assessing it's effectiveness. This study will therefore not only examine changes in outcome variables between the start and end of treatment, but

also assess any changes in potential treatment effects between the end of treatment and three-months follow up.

1.7 HYPOTHESES

The following hypotheses will be examined in this study:

Hypothesis I

There will be a significant reduction in weight for participants pre- and post intervention.

Hypothesis II

There will be a significant improvement in eating behaviours of participants pre- and post intervention. Specifically it is expected that there will be:

- a reduction in consumption of foods high in fat and sugar
- an increase in fruit and vegetable consumption
- a decrease in food responsiveness, emotional overeating and emotional undereating
- an increase in satiety responsiveness

Hypothesis HI

There will be a significant improvement in physical activity levels of participants pre- and post intervention. Specifically it is expected that :

- levels of physical activity will increase
- levels of sedentary behaviour will decrease

Hypothesis IV

There will be no significant increase in eating pathology as assessed by behaviours relating to dieting, bulimia and oral control of participants pre- and post intervention.

Hypothesis V

Parental feeding style will change post intervention. Specifically it is expected that there will be a significant reduction in parental encouragement to eat, parental control over eating, emotional use of food and instrumental use of food.

Hypothesis VI

There will be a significant improvement in general psychological functioning of participants pre- and post intervention as indicated by:

a) mood

b) self-esteem

c) parental report of emotional/behavioural difficulties

CHAPTER 2

METHOD

2.1 DESIGN

The study was an uncontrolled trial of 4 consecutive, treatment groups for children with obesity. All treatment groups received the same intervention and were run as individual groups for practical reasons only. The first group, a pilot group, will be referred to as group I with consecutive groups referred to as groups II, III and IV. Participants referred to the study were initially allocated to a treatment group (pilot group and group II) in order of presentation. Subsequent cases were then allocated to the control group where no treatment was delivered for approximately three months. Control group participants subsequently attended treatment group III. Any further cases were allocated to treatment group IV.

2.2 PARTICIPANTS

In total 65 children aged 7 to 14 and their families contacted the study. Of these, 28 children were not eligible for the group (too old (6), had other medical difficulties (1), were not overweight (3) or lived too far away (5)). Thirteen did not respond to information sent out.

Thirtyseven children were invited for assessment. Subsequently six children were assigned to the pilot group, 10 children to group II, nine children to group III, eight

children to group IV and two families chose not to participate in the study following assessment for personal reasons. Six children were allocated to the control group prior to treatment. However, one of these children dropped out during the control period due to a change in personal circumstances. In total 33 children started the treatment.

Of those children attending a group 10 were male and 23 female with an age range of 8 – 13 (mean age 10.06, standard deviation 1.56). Two thirds (66.7%) of the sample were white, 24.2% black, 6.1% asian and 3% mixed race.

All children had a Body Mass Index (BMI) that was $\geq 98^{th}$ centile for age and sex. The mean percent Body Mass Index (%BMI) for children was 192.14 (range 137.80 – 256.7).

2.3 ETHICAL CONSIDERATIONS

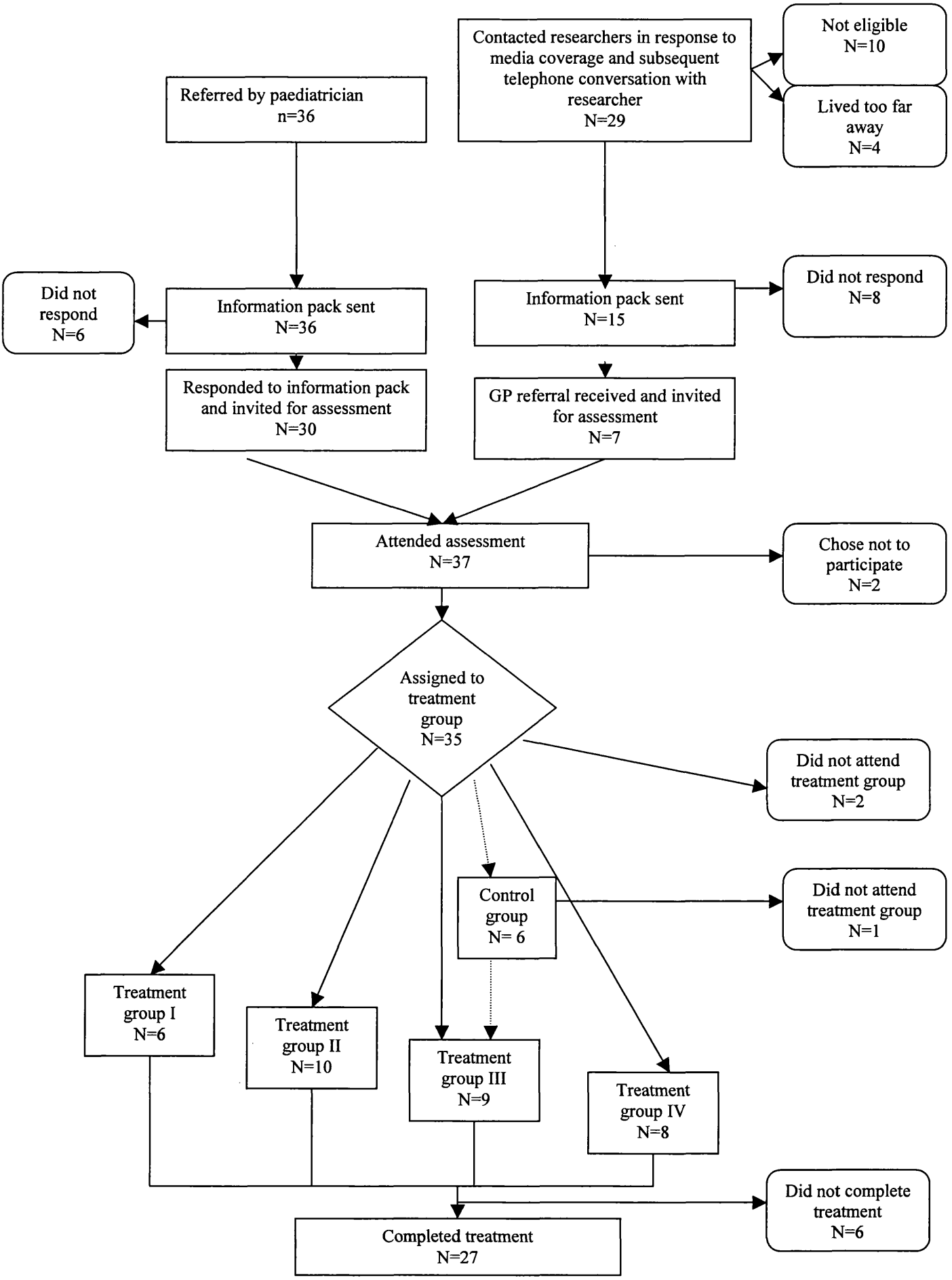
Ethical permission of this study was granted from the joint UCL/UCLH Committees on the Ethics of Human Research as well as the GOS/ICH research committee (see Appendix A).

2.4 PROCEDURE

2.4.1 Recruitment

Participants were recruited over a 13 month period between February 2002 and March 2003 through health professionals and the media. The recruitment path is illustrated in Fig 1.

Fig 1 Referral diagram



2.4.1.1 Recruitment through health professionals

Participants were initially recruited through GPs, paediatricians, school nurses and dieticians in the North London area, (see Appendix B). All referrals were made to a paediatric outpatient clinic at Great Ormond Street Hospital, London. Children presenting to the outpatient clinic who were potentiality eligible to participate in the study were given verbal information based on an information sheet (see Appendix C) aout the study by the paediatrician. If they and their carers then expressed an interest in obtaining further information their names were forwarded to the researchers.

2.4.1.2 Recruitment through media

Due to the low number of potential participants presenting to the clinic during the initial three months of recruitment, details of the study were also published in an article about childhood obesity appearing in local media during May 2002.

Those contacting the study as a result of media coverage had an initial telephone conversation with one of the researchers, in which they were given a brief background based on an information sheet (see Appendix C) about the study. Families who were not eligible for the group or did not want to take part were advised on other sources of support (e.g. through their GP or the charity Weight Concern).

As the intervention was carried out at a hospital all children needed a medical referral in order to be assessed. Families were provided with a letter to take to their

GP, explaining how to refer the child if the GP agreed to their inclusion (see Appendix D).

2.4.2 Eligibility criteria

Children were considered eligible to participate in the experimental phase of the study if they were i) between 8 and 12 years of age, ii) had a BMI above the 95th centile, iii) had at least one parent or carer willing to participate in treatment and iv) had English as a first language for both parent and child. Children who had an identified medical cause of obesity or who were at the time of referral receiving psychological or psychiatric treatment were not eligible to participate as there is no evidence that the needs of such children could be met by the treatment offered. Furthermore, in order to assess the effectiveness of the treatment appropriately, variability within the sample needed to be minimised. Following the pilot group, eligibility criteria were reviewed and the age range was increased from 8-12 years to 7-13 years in order to increase potential referrals to the study.

2.4.3 Initial Information

Information packs were sent out to all families expressing an interest in the study (see Appendix D). These information packs contained 2 sets of general information about the Traffic Light Programme as well as two information sheets about the study (one for the parent and for the child each). Families were then contacted by telephone to find out whether they were still interested in taking part in the study.

2.4.4 Assessment

Assessment appointments were offered to 37 families at Great Ormond Street Hospital, London (see Appendix F). At the beginning of the assessment any additional questions were answered. Furthermore, it was explained again to families that they were under no obligation to take part in the study, free to withdraw from it any time and that all information would be treated confidentially. Children and parents were then asked to complete a consent form each.

2.4.4.1 Clinical Assessment

Part I of the assessment involved gaining some general information with the purpose of ensuring all eligibility criteria were met. This included: the referral route; presenting problems; family composition; history of weight concern; previous contact with health services; current functioning in relation to home, school and peers; current family circumstances; recent life events; family eating and activity patterns; motivation to change and expectations and commitment to treatment.

2.4.4.2 Medical Assessment

Each child's height and weight was measured and recorded followed by a routine medical screening to exclude medical aetiology and assess child's level of overweight. Children's height and weight was recorded at all these times and additional weights for children were recorded at each group session.

2.4.4.3 Psychological Assessment

In order to obtain baseline information and assess possible changes over the course of treatment all children and their parents/carers completed a questionnaire battery

each prior to starting the intervention, on completion of the intervention and again three months later at follow-up (see Appendix). The questionnaire was designed to obtain information on children's eating attitudes, eating behaviour, levels of physical activity, psychosocial functioning and parental feeding style (see 1.5 Psychological Assessment below).

2.4.4.5 Treatment allocation

After completing the assessment, families were advised that the researcher would need to evaluate the assessment information and that following this the family would be informed within 1 week whether they were eligible to take part in the study. Families who met eligibility criteria after the assessment were then sent a letter informing them of the start date, time and venue of the 1st session. Families who were assigned to the control group were given a start date for three months after the assessment. On completion of the assessment process a letter was sent to the referrer of each child with a summary and outcome of the assessment. This included information on reason for referral, family circumstances, present social circumstances, history and development of weight problems, current eating difficulties and impact on family as well as other concerns (e.g. school functioning). It also contained information on previous contact with services, motivation for losing weight as well as brief information on the medical assessment and recommendations for further treatment.

2.4.5 Treatment Groups

2.4.5.1 Pilot Group

The first group was set up to be a pilot group so that the group facilitators could familiarise themselves with the programme and ensure all assessment materials and materials used for the group were appropriate. As a result of this, slight modifications were made to the assessment protocol after completion of the pilot group. Furthermore, to allow for consolidation of new skills, treatment length was changed from eight to ten weekly session. In addition to this, the last two sessions of the intervention were held at fortnightly rather than weekly intervals, to allow families increasing autonomy over implementing the programme, whilst still benefiting from continued support. No other changes to the programme were deemed necessary.

2.4.5.2 Treatment Group

Children were assigned in order of presentation to one of four treatment groups. Due to the small number of eligible participants being referred to the study it was initially not possible to allocate children to a control group.

The first six children accepted onto the programme were assigned to the pilot group, the next 10 to group II. Following this the number of referrals slightly increased and therefore any further referrals who were assessed and accepted at the time of recruiting cases for group II were assigned to the control group (n=6). These children received no treatment for the duration of treatment of group II and five of these children subsequently attended group III. One of these children was not able to move on to the treatment phase due to personal circumstances. Four more children were assigned directly to group III. Once no more referrals for group III could be accepted

all subsequent cases were assigned to group IV (n=8). Therefore, four consecutive treatment groups were run at an inner city paediatric hospital between February 2002 and September 2003.

A separate set of clinicians facilitated each group. Both child and parent groups were run by a psychologist and a further facilitator with a background in mental health. A dietician was present in sessions specifically addressing nutrition.

2.4.6 The intervention

2.4.6.1 Background

The Traffic Light Programme was based on the 'Stoplight Diet' for children developed by Len Epstein (1988). It uses behaviour modification to increase healthy eating and physical activity and decrease unhealthy eating habits and sedentary behaviours. Food items are classified according to the colours of a traffic light: red foods (Stop! Think!) are high in fat and calories and low in nutritional value, yellow foods, which are foods other than fruit and vegetables, not high in fat or sugar (Approach with caution) and green foods (Go! Include as many as you can), which are low calorie nutritious items. All family members are encouraged to adopt a healthy life-style and maximise support to the individual child.

2.4.6.2 Format

Children and their parents/carers attended 10 weekly sessions for 1 ½ hours each, followed by two fortnightly sessions and a follow-up session three months later (see Appendix H for an outline of session topics).

Children, parents and group facilitators met together for the initial 30 minutes of each session to receive feedback on their food diaries. During this time families also completed a 'quiz' based on the previous week's topic which was then discussed with the group. In addition to this any questions about the programme were answered. Children and parents then split into separate groups. The session topics were identical for adults and children, but presentation was modified to an appropriate level for the child group. At the end of each session all participants received a written summary of the week's topic and were asked to read this before the next session.

2.4.6.3 Behavioural modification

Principles of learning theory were incorporated in the form of behaviour modification, goal setting, positive reinforcement, stimulus control and self-monitoring. Each child was encouraged to set a realistic goal based on the principles of the Traffic Light Programme for each week. This included goals such as increasing fruit or vegetable consumption, increasing activity levels and decreasing sedentary behaviour. A suitable reward (positive reinforcement) was agreed with parents in advance and goals were reviewed at the beginning of each session together with group facilitators.

Children and parents were encouraged to monitor their goals and diet by keeping a daily food and activity diary. Principles of stimulus control were implemented primarily in relation to 'red' foods, by agreeing not to keep such foods in the home, for example. A further form of positive reinforcement was implemented through a 'points system', whereby children had the opportunity to earn points for attending

and participating in the sessions as well as carrying out 'homework' tasks set for the previous week. These points could then be exchanged for small gifts at the end of each session.

The role of support of friends and family further drew on concepts of learning theory. In addition to the social support received by other groups through attending sessions, parents in particular received information on positive reinforcement. This included information on the role of praise in increasing desired behaviour such as exercise and healthy eating and decreasing unwanted behaviour such as overeating and sedentary behaviour. In addition to this the role of modeling in shaping behaviour was discussed. Parents were made aware of the importance of setting an example of desired behaviour through their own actions to their children.

The use of behavioural modification will be explained in more detail with respect to other components of the programme in the following.

2.4.6.4 Diet

Sessions on nutrition included information on the role of food in providing energy and concepts of energy balance. Furthermore, information was provided on the different food groups and the role of portion control and a balanced diet in maintaining a healthy life-style, according to the 'Balance of Good Health' model proposed by the government (British Nutrition Foundation, 2003). Recommendations for portion size and average daily nutritional requirements were based on the Dietary Reference Values for Food, Energy and Nutrients for the United Kingdom, Department of Health (1991). Again principles of learning theory were incorporated

in terms of explaining the concept of stimulus control and how this relates to eating. For example families were asked not have any 'red' (foods high in fat or sugar) in the house as having such foods in close proximity increases the likelihood of eating them.

2.4.6.5 Additional components

Additional components were incorporated in the programme to deal with issues such as teasing and bullying. Skills for managing such situations were discussed and practised through role-play. These skills were further elaborated on in sessions dealing with 'difficult situations' such as Christmas or parties, were it might be difficult to stick the Traffic Light Programme due to increased exposure to 'red' foods and social pressure. This included strategies such as planning ahead, realistic goal setting and increasing will-power. These techniques were further elaborated on in addressing relapse prevention.

2.4.6.6 Activity levels

A further concept that was introduced was that of the role of exercise versus sedentary behaviour in relation to weight management. This included information on different types of exercise as well as encouraging the concept of making simple exercise such as walking, part of a general lifestyle. Children were encouraged to produce their own ideas of 'fun' exercise and exercise in the form of dancing was incorporated at the end of weekly sessions. Once the idea of increasing activity levels and decreasing sedentary behaviours had been introduced, children were set the goal of spending no more than a total of 2 hours per day watching TV or playing computer games.

2.4.6.7 Modifications to the original programme

A number of modifications were made to the original treatment programme. Firstly whereas, the original programme is based on a dietary model of counting calories it was decided that it would be more appropriate to use a model that emphasises healthy eating in general. This is thought to be a simpler method to implement for children as well as more likely to encourage general life-style changes, rather than short-term dieting. In addition to this it was felt that the notion of 'calorie-counting' may be met with resistance by parents due to possible concerns about an association of dieting behaviours and eating disorders in children.

2.5 MEASURES

2.5.1 Physical Measurements

Weight

Children were weighed using calibrated Salter scales.

Height

Height was measured using a Harpenden Stadiometer.

Degree of overweight rather than absolute weight is needed to take account of the fact that children continue to grow at differing rates dependent on age and gender during the programme. The American tradition is to use percentage of ideal bodyweight (IBW), with 90-100% IBW being considered the normal range, but there are no UK reference data for this calculation. Degree of overweight is therefore reported as percentage BMI (%BMI). Although not directly comparable to IBW,

%BMI is similar in that it is also based on national reference data for age and gender and adjusted for height.

2.5.2 Psychological Assessment

Two sets of questionnaire batteries were designed to collect information from the participating children and their parents/carers. They included the following components:

General Demographic Information

The initial part of the questionnaire was designed to obtain general demographic information, including the age of participants, number of family members, living situation and social status of the family. Social status was evaluated using the Registrar General's Classification (Five Class) System. Generally father's occupation was taken to assign social class. In cases where this information was not available or inappropriate, mother's occupation was used where possible.

Eating Attitudes

The Children's Version of the Eating Attitude Test (ChEAT; Maloney, Bell McGuire & Daniels, 1988) is a 26-item, six point forced choice self report inventory that assesses food preoccupation, dieting patterns and eating attitudes. Scores range from 0 – 78, with higher scores indicating higher levels of the eating behaviours and attitudes measured. It includes items such as 'I think about food a lot of the time' and 'I eat diet foods'. The ChEAT was designed for use with children aged between eight and 13 and is based on the Eating Attitude Test. (Garner & Garfinkle, 1979). Internal

consistency is reported as 0.76 and test-retest reliability as 0.81. For the purpose of this study, the dieting, bulimia and oral control sub-scales were analysed.

Diet and Eating behaviour

Food Frequency Questionnaire (FFQ; Hammond, Nelson, Chinn & Rona, 1993). The FFQ is a parent completed instrument assessing the frequency of 35 food items by a child over the previous month. The food items listed in the questionnaire are considered to represent the major dietary sources of energy, fat and fibre; categories for meat, dairy products, pulses, cereals, fruit and vegetables. Within a food group there is a choice of items varying in fat and fibre intake, such as skimmed milk and full-fat milk in dairy products. For each item parents are asked to indicate how often in the previous month their child had eaten from a particular food group: never, once per month, once per fortnight or the number of days per week from 1-7.

The validity of the FFQ has been tested by comparing the frequency of consumption reported in the previous month with daily recalls over 14 days. Validity was assessed using weighted kappa statistics. Moderate agreement was found for categories of high fat, low fat and low fibre (K_{wt} = 0.58, 0.71 and 0.59 respectively). Agreement for low fibre was reported as (K_{wt} = 0.48).

For the purpose of this study a selection of food items on the FFQ representing 'red foods' (high in fat or sugar) and 'green foods' (fruit and vegetables) were examined. For the 'red' food group these consisted of: Sausages; Processed meats; fish fingers, fish cake or fish in batter; whole milk; sweet biscuits; cakes, scones; sweets, chocolate bars; crisps and chips or fried/roasted potatoes. Internal consistency of this

scale was 0.83. Green foods were assessed by consumption of: green cooked vegetables; other cooked vegetables; salads and fruit. The mean number of foods consumed daily from these categories was then calculated. Internal consistency for this scale was calculated as 0.89.

Children's Eating Behaviour Questionnaire (**CEBQ**; Wardle, Guthrie, Sanderson & Rapoport 2001) is a 35-item parent rated measure assessing eight different dimensions of eating styles in children. These dimensions are represented by the following scales: enjoyment of food, desire for drinks, slowness in eating, fussiness, responsiveness to food, satiety responsiveness, emotional overeating and emotional undereating. For the purpose of this study the four latter subscales were analysed. Statements are rated between 0 (never) and 4 (always). Scores range from 0 – 140 for the CEBQ total and from 0 – 16 for the subscales of emotional overeating and emotional undereating, from 0 – 20 for food responsiveness and from 0 – 36 for Satiety responsiveness. Internal consistency ranges from 0.72 to 0.91 for the eight sub-scales and, test-retest reliability ranges from 0.52 to 0.83).

Parental feeding style

Parental Feeding Style Questionnaire (**PFSQ**; Wardle, Sanderson, Guthrie, Rapoport & Plomin, 2002). The PFSQ is a 27 item scale assessing parental attitudes and behaviours in relation to their child's eating. It consists of four subscales (emotional feeding, instrumental feeding, prompting and encouragement to eat, control over eating) and includes items such as "I reward my child with something to eat when she is well behaved" and "I decide how many snacks my child should have". Response options are: 'I never do', 'I rarely do', 'I sometimes do', 'I often do'

and 'I always do' and are scored 1-5. Scale sores are obtained by calculating the mean of the items comprising each scale and therefore range from 1 to 5, with higher scores indicating a greater presence of the feeding style assessed. Internal consistency is reported as follows: emotional feeding 0.65, instrumental feeding 0.85, prompting or encouragement to eat 0.69 and control over eating 0.77. Test-retest reliability is reported as emotional feeding 0.76, instrumental feeding 0.82, prompting or encouragement to eat 0.76 and control over eating 0.83.

Physical activity

Activity scale

The activity is a scale designed to assess levels of sedentary behaviour and activity in children and is based on a previous study by Wardle, Guthrie, Sanderson & Plomin (2001). The scale consists of two sections. On the first section parents are asked to rate the number of hours their child spends watching TV and videos or playing computer games, with weekdays and weekends assessed separately. The second section requires parents to rate how often their child engages in sports or games which cause him or her to get out breath or sweat per week, as well as how physically active their child is in comparison to other children. For the purpose of this study, only the former statement was evaluated. Internal consistency for the sedentary behaviour scale was found to be 0.7. As the activity scale consists of only one question, internal consistency was not assessed.

Psychosocial functioning

Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The SDQ is a brief behavioural screening questionnaire that asks about 25 positive and negative

attributes. The items are divided between five scales of five items each generating scores for conduct problems, hyperactivity – inattention, emotional symptoms, peer problems, and prosocial behaviour. The first four scales can be summed to give a total difficulties score. Items include statements such as: [the child is] "considerate of other peoples feelings" and "generally liked". Possible responses are 'not true', 'somewhat true' and 'certainly true' and are scored 0-2. The maximum score for each subscale is 10 and for the total difficulties score is 40. Higher scores indicate higher likelihood of casesness.

The SDQ has been compared to the well established Child Behaviour Checklist (CBCL)(Achenbach, 1991). The SDQ has been found to be as effective in detecting emotional and conduct problems and superior in detecting difficulties with attention and hyperactivity compared to the CBCL (Goodman & Scott, 1999). Internal consistency has been reported as .88 for the total difficulties score (Goodman, 1997) and test-retest reliability as .85 (Goodman, 1999). The SDQ is available as a self-report measure for children and teenagers between 11 and 16 as well as an informant based version to be completed by teachers or parents for children and teenagers between 4 and 16. For the purpose of this study the informant-rated version was included in the parent questionnaire and the total difficulties score only, will be evaluated.

Children's Depression Inventory (CDI; Kovacs, 1992). The CDI is a self-rated scale screening for symptoms of depression. It was specifically designed for use with school aged children and teenagers. It can be used to distinguish children with depressive or dysthymic disorders from those with other psychiatric conditions and

"normal" school-children. Furthermore, it is sensitive to changes in depression over time and presents an acceptable index of the severity of depressive symptoms. There are two versions of the scale: a 27 item standard version and a 10 item short form. The standard form incorporates subscales of negative mood, interpersonal problems, ineffectiveness, anhedonia and negative self-esteem. There are no subscales on the short form. Each item consists of three statements, such as: "I do most things o.k.", "I do many things wrong" and "I do everything wrong"; with the child being asked to indicate which of these matches most closely how he/she has felt in the past two weeks. Items are scored 0-2. Total scores on the standard version range from 0 – 81 and 0-30 on the short form. Raw scores may be converted into T-scores. Higher scores are associated with increased severity of symptoms of depression, with a t-score between 45 and 55 being considered average. Numerous studies have assessed test-retest reliability and internal consistency for the CDI. Internal consistency has been reported as ranging from .71 and .89. and test-retest reliability as ranging from .38 - .87 (Kovacs, 1992).

Piers-Harris Children's Self-Concept Scale (Piers-Harris; Piers & Harris, 1969). The Piers-Harris is an 80 item self-report measure designed to assess self-concept in children and adolescents. Items include statements like: "My looks bother me" and "I am well behaved in school". It consists of the following six subscales: behaviour, intellectual and school status, physical appearance and attributes, anxiety, popularity and happiness and satisfaction. For the purpose of this study the Piers-Harris total score and the subscale of physical appearance were examined. Responses are yes or no and scored 0 or 1. Therefore the total score may range from 0 – 80. A high score on the scale suggests positive self-evaluation and a low score suggests negative self-

evaluation. Test-retest reliability has been reported as ranging from .42 to .96 and internal consistency as ranging from .88 to .93.

Other measures

The current study is part of a larger research project being carried out by researchers at University College London and Great Ormond Street Hospital for Sick Children, London. Therefore a number of additional measures were added to the questionnaires to be analysed elsewhere. These measures are: the Eating Attitude Test (Garner & Garfinkle, 1979), the Parenting Scale (Johnston & Mash, 1989), the Perception of Teasing Scale (Thompson, Cattarin, Fowler & Fisher, 1995) and an adapted version of the Figure Rating Scale (Thompson & Althabe, 1991) to assess body image. Furthermore, participants were asked to keep weekly food diaries at the first and last week of attending the programme.

CHAPTER 3

RESULTS

The results chapter is divided into eight sections. The first section gives a general description of the sample. The remainder of the chapter explores changes in individual variables between the start and end of treatment and the end of treatment and follow-up. Section two examines changes in weight, section three changes in eating behaviours and section four changes in physical activity levels. Changes in eating attitudes are considered in section five. Changes in the parental relationship to children's eating are then considered in section six. Section seven explores changes in general psychological functioning as measured by mood, self-esteem and self-perception of physical appearance.

3.1 DATA ANALYSIS

The sample consisted of four separate treatment groups. However, no significant differences between the groups with regards to weight change were found (see Appendix I). Furthermore, intraclass correlation was calculated as .094 and the four groups were therefore collapsed into one to ease statistical analyses.

Data was collected at the start of treatment, on completion of treatment and at follow-up, three months later. The sample size at follow-up (n = 20) is considerably smaller than the sample at the start (n = 33) and end of treatment (n = 27). Repeated Measures Anovas were carried out to assess changes in %BMI between start, end and follow-up of treatment. However, follow-up data for the remaining dependant

variables was available for only between 13 and 16 cases. Therefore, in order to maximise numbers for inclusion in the analyses, t-tests rather than Multiple Analyses of Variance were carried out. More specifically, paired sample t-tests were conducted between the start and end of treatment, and between end of treatment and follow-up. Pearsosn's correlation for bivariate analysis were carried out to analyse the relationship between mood and %BMI and self-esteem and %BMI. In addition, Chi square tests were performed to assess the relationship between gender and attrition.

All dependent variables were checked for normality (skewness and kurtosis). As a result of this it was decided to use non-parametric analyses to assess changes in diet with respect to 'red' food consumption (Wilcoxon signed ranks test) and parental relationship to children's eating (Wilcoxon signed ranks test).

As a smaller section of the sample is included in analyses examining end of treatment and follow up variables in comparison to start and end of treatment variables, there is at times a difference in means reported for end of treatment variables between the two different time periods considered. To examine whether such differences were due to non-random attrition at the end of treatment, differences between participants attending follow-up and those not attending follow-up were examined further. A series of independent sample t-tests, and their non-parametric equivalents where indicated, were therefore carried out between the two groups on all end of treatment variables. However, no significant differences were found (see Appendix J), which suggests that the likelihood of non-random attrition is small.

It should also be noted that as numbers in the control group were small (n = 6) it was felt that power of any statistical analysis involving the control group would be low. Therefore this data was only used to evaluate changes in weight (section 3.3), bearing in mind the likely limitations to any conclusions drawn.

3.2 CHARACTERISTICS OF THE SAMPLE

3.2.1 Children

The mean age for the sample of children participating in this study (n=33) was 10.06 years (sd = 1.56, range 8-13 years) (see Table 1), and consisted of 10 (30.3%) boys and 23 (69.7%) girls. Two thirds (66.7%) of the sample were white, 24.2% black, 6.1% asian and 3% mixed race.

As mentioned in the Introduction, degree of overweight rather than absolute weight is needed to take account of the fact that children continue to grow at differing rates dependent on age and gender during the programme. Degree of overweight is therefore reported as percentage BMI (%BMI), with 100%BMI being ideal weight for height. Percent BMI was calculated using the 'Weight 4 Height, Version 4.23' package.

Mean %BMI for children was 192.14 (sd = 30.41, range 137.80 – 256.7). Mean height was 1.51 m (range 1.36 – 1.67 m) and mean weight was 75.52 kg (sd = 17.90, range 43.5 – 107.75 kg).

There were no significant differences in %BMI at the start of treatment between male and female participants. Male participants (n=10) had a mean %BMI of 184.23 (sd = 26.88) and female participants (n=23) had a mean %BMI of 195.57 (sd=31.76), (t(23) = -.98, p =.54).

Furthermore, the relationship between children's mean age at the start of the group and their %BMI was not significant (r = -.15, p = .41).

3.2.2 Parents

The majority of children were reported to be living with both parents (60.6 %), 33.3% were living in a single parent family and one child (6.1%) lived with her grandparents. In total 33 children were in the treatment group, of which 94% were accompanied by their mothers and one child (6%) was accompanied by her grandmother.

In total 33.3% of mothers reported they were in full time employment, 30.3% in part time employment and 36.4% reported not being in paid employment. Of those mothers who were not working (n = 12), half (50.0%) were full-time students, a further 33.3% were housewives, 8.3% described themselves as retired, 8.3 % as unemployed and a further 8.3% did not give information about their status.

Of those children who lived with both of their parents (n = 20), 70% had fathers in full-time paid work, 15% in part-time paid work, 5% were retired and 5% did not give any information on their employment status. No information was available for fathers who did not live with the child.

In accordance with the Registrar General's five class Classification for occupation and head of household, 33.3% of parents were classified as Social Class I (Managerial and Professional), 3.0% as Class II (Intermediate), 9.1% as Class III (Small employers and own account workers), 6.1% as Class IV (Supervisors/ craft related) and a further 15.2% as Class V (working class). Almost a third (33.3%) did not provide sufficient information to assess their social status.

The mean BMI for mothers was 31.34, ranging from 19.67 to 50.75, (sd = 7.44). As mentioned in the Introduction, for adults a BMI between 18.5 and 24.9 falls within the healthy range. A BMI of 25 - 29.9 falls within the overweight range and an individual with a BMI of 30 and above would be considered obese. The majority of mothers in the present sample therefore met criteria for obesity.

Table 1: Characteristics of the sample (n=33): children's age, %BMI, weight, height and mothers' BMI

Variable	Mean	(SD)
Age	10.06	(1.56)
%BMI	192.14	(30.41)
Weight (kg)	75.52	(17.90)
Height (m)	1.51	(8.86)
Mother's BMI[1]	31.34	(7.44)

[1] n= 31 for mother's BMI as there were two sets of two siblings each in the sample

3.2.3 Characteristics of children who did not complete the treatment

Of the 33 children who started treatment, six did not complete the treatment and including those six, thirteen did not attend for follow-up. There was no significant difference in age or weight between children who did not complete the treatment and children who continued with the treatment. At the end of treatment, 10 % of boys had dropped out, whereas 21.7% of girls had not completed treatment.

Table 2: Differences in age and weight between children who did and children who did not complete the treatment

	Completed treatment (n=27)	Did not complete treatment (n= 6)	T-test
Variable	Mean (SD)	Mean (SD)	P (2 tailed)
Age (years)	10.26 (1.58)	9.17 (1.17)	.12
Weight (kg) at start of treatment	74.65 (17.15)	79.42 (22.34)	.56

At follow-up there were no significant differences with respect to age and weight between those children who attended and those who did not (see Table 3). Furthermore, no significant relationship between gender, and drop-out was found, x^2 (1) = .464, p = .640 (exact significance) at the end of treatment or follow-up, x^2 (1) = .530, p = .701 (exact significance). Of the children who did not attend at follow-up, 30% were boys and 43.5% were girls.

Table 3: Differences in age and weight between children who did and children who did not attend for follow-up

	Attended for follow-up (n=20)	Did not attend for follow-up (n=13)	T-test
Variable	Mean (SD)	Mean (SD)	P (2 tailed)
Age	10.45 (1.50)	9.46 (1.51)	.08
Weight at start of treatment	75.37 (18.42)	75.76 (17.82)	.95

3.3 CHANGES IN %BMI

Figure 2 below shows changes in %BMI, during the three months no intervention control period, as well as between the start and end of treatment, and between the end of treatment and the follow-up session three months later.

3.3.1 Changes in %BMI during the 3 months no intervention period of the control group

There were no significant changes in %BMI for the control group during the 3 months no treatment phase[1] (see Figure 1). Mean %BMI at the start of the control period was 182.59 (sd = 21.66) and 179.26 (sd = 24.59) at the end of the control period, ($t(5) = .68$, $p = .53$).

3.3.2 Changes in %BMI between start, end and three months follow-up of treatment

Mean %BMI decreased significantly from 185.92 (sd = 25.97) at the start of treatment to 175.89 (sd = 27.68) at three months follow-up ($F(1, 19) = 22.44$, $p<.001$) (see Figure 2). This represents a reduction of -10.03 %BMI. Bonferroni post hoc analyses revealed that reduction in %BMI between start and end of treatment ($\bar{x}$ = 176.29, sd = 26.87), was also significant. However, whilst %BMI continued to decrease slightly between end and follow-up, this difference was not significant.

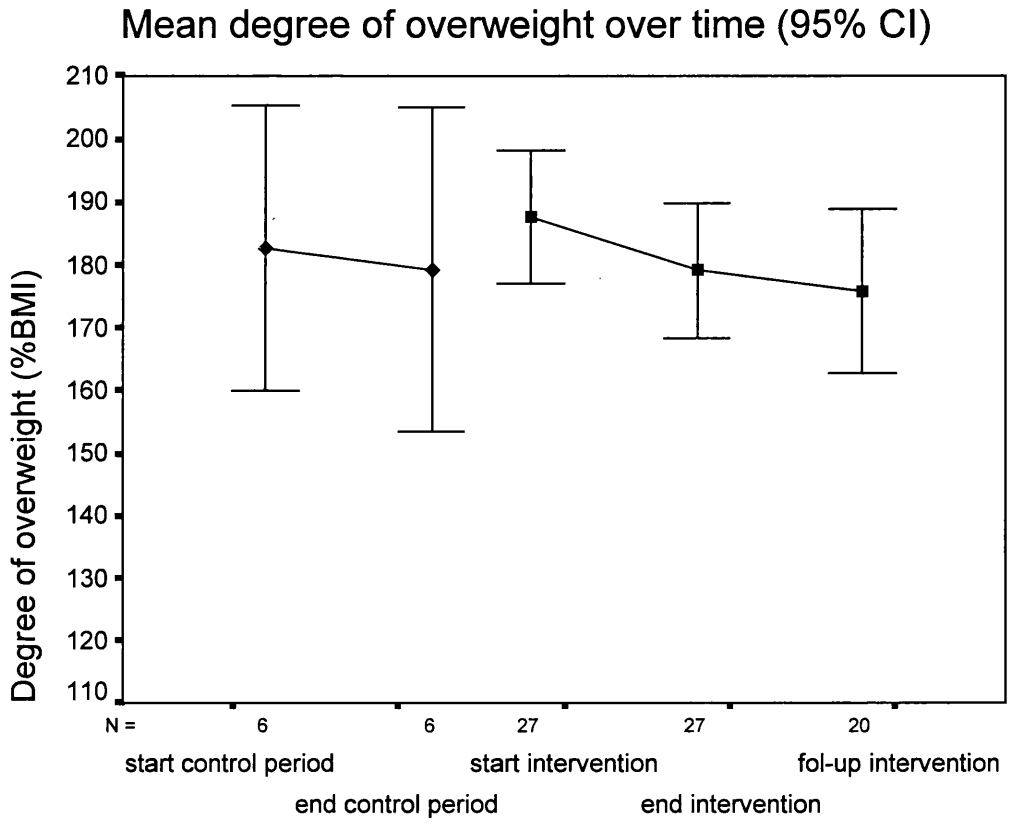
3.3.3 Changes in %BMI between start, end and three months follow-up of treatment carrying out intention to treat analyses

To avoid a bias of including only children who completed the treatment in the analysis, results were replicated using the total sample with initial %BMIs substituted for later missing time points. In this analysis children had a mean %BMI of 187.63 (sd = 26.41) at the start of treatment, which reduced significantly to a mean of 178.93 (sd = 27.71) by three months follow-up ($F(1, 9) = 312.54$, $p < .001$).

[1] Values for %BMI for the end of the control period and start of the intervention period differ slightly as the control period value was calculated for the control sample (n=6) only, whereas the intervention value was calculated for the children completing treatment (n=27) and follow-up for n=20.

Bonferroni post hoc analyses confirmed that reduction of %BMI between the start and end of treatment ($\bar{x}$ = 179.23, sd = 27.09) was significant, but reduction between end and follow-up was not.

Fig 2: Changes in %BMI



3.4 CHANGES IN DIET AND EATING BEHAVIOURS

In order to assess whether there were any changes in eating behaviour associated with the treatment, two aspects of eating behaviour were examined: diet, assessed by the Food Frequency Questionnaire and eating behaviour as measured by the Children's Eating Behaviour Questionnaire (CEBQ).

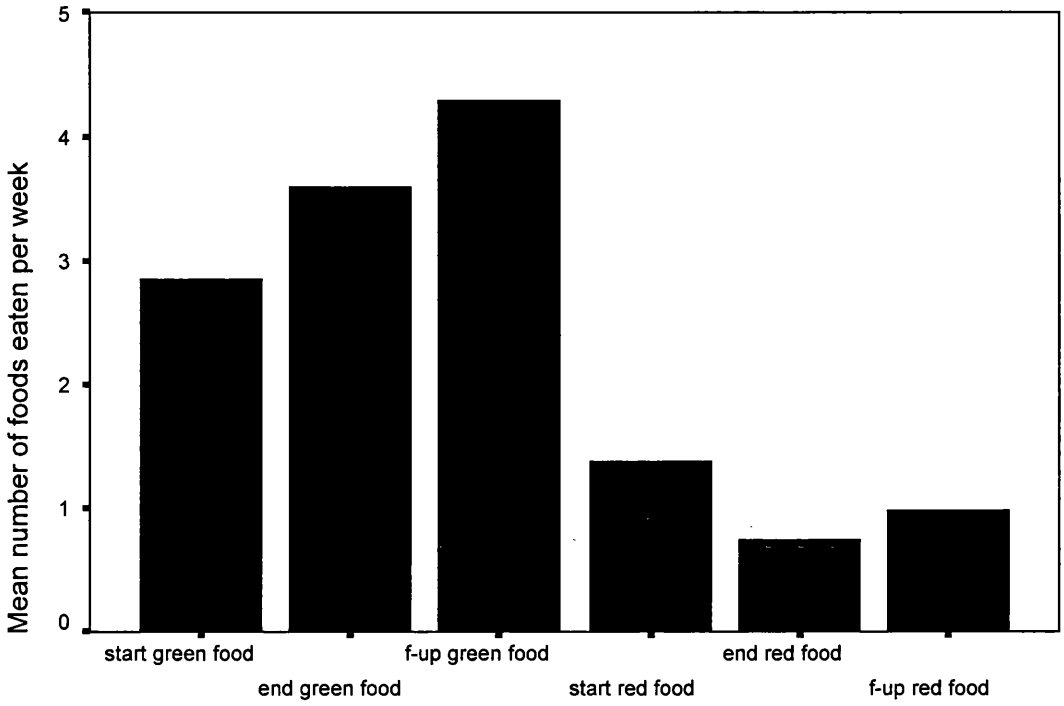
3.4.1 Changes in diet

To examine whether the children's diet changed in relation to treatment parents were asked to rate the frequency of consumption of a number of foods. In particular the consumption of 'red' (high in fat and sugar) and 'green' (fruit and vegetables) foods was examined as these were the food groups targeted by the treatment.

There was a significant decrease in the number of 'red' foods consumed per week from the start of treatment to the end of treatment (start $\bar{x}$ = 1.40, sd = 1.12; end $\bar{x}$ = .76, sd = .88) (z = -3.59, p < .001). However, these changes were not maintained at three-months follow-up. In fact, there was a significant increase in reported weekly consumption of red foods at the end of treatment ($\bar{x}$ = 1.0, sd = .86; z = -2.41, p = .016) (see Figure 3).

Weekly consumption of green foods significantly increased between the start and end of treatment (start $\bar{x}$ = 2.86, sd = 1.99; end $\bar{x}$ = 3.61, sd = 2.17), (t(23) = -2.12, p = .045). This gain continued to improve significantly at three-months follow-up with mean consumption of 4.3 green foods per week (sd = 1.71), (t(12) = -2.73, p = .018).

Fig 3: Mean number of 'red' and 'green' foods eaten per week



Start green n = 24, end green n = 24, f-up green n = 13, start red n = 33, end red n = 24 and f-up red n = 16. Numbers included in analyses for start of treatment differ between red and green foods, as non-parametric statistics were used for red foods, and t-tests for green foods.

3.4.2 Changes in eating behaviour

On the CEBQ parents were asked to rate a number of their children's eating behaviours. Specifically, eating behaviours relating to the concepts of: 'responsiveness to food', 'satiety responsiveness', 'emotional overeating' and 'emotional undereating' were examined.

The results showed a significant decrease in responsiveness to food between the start and end of treatment (start $\bar{x}$ = 3.83, sd = .80; end $\bar{x}$ = 3.08, sd = .77), (t(23) = 3.95, p = .001). In contrast, satiety responsiveness significantly increased between the start and end of treatment (start $\bar{x}$ = 1.91, sd = .57; end $\bar{x}$ = 2.44 sd = .47) (t(23) = -9.50, p < .001). There were no significant changes reported in levels of emotional

overeating between the start and end of treatment (start $\bar{x}$ = 3.22, sd = .96; end $\bar{x}$ = 2.98, sd = .61) (t(23) = 1.53, p = 1.40). Similarly there were no significant changes between levels of emotional undereating between start and end of treatment (start $\bar{x}$ = 2.47, sd = .66; end $\bar{x}$ = 2.58, sd = .34) (t(23) = .96, p = 3.5).

Furthermore, there were no significant changes in 'responsiveness to food', 'satiety responsiveness', 'emotional overeating' and 'emotional undereating' between end of treatment and follow-up.

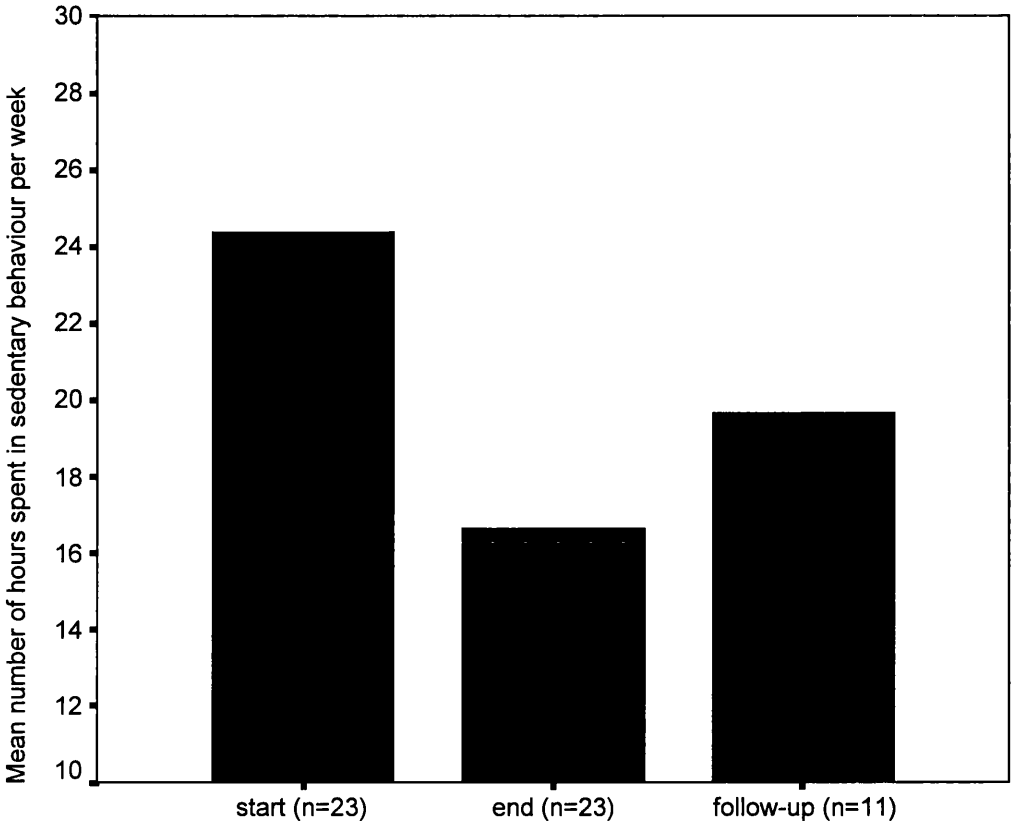
3.5 CHANGES IN SEDENTARY BEHAVIOURS AND PHYSICAL ACTIVITY LEVELS

3.5.1 Changes in sedentary behaviour

Sedentary behaviours were measured by the number of hours children spent engaged in behaviours such as watching TV or videos and playing on the computer per week.

There was a significant decrease in number of hours spent in sedentary behaviour per week between the start and end of treatment (start $\bar{x}$ = 25.70, sd = 10.62; end $\bar{x}$ = 17.43, sd = 1.64), (t(22) = 3.08, p = .01). This was a mean decrease of just over eight hours per week. However, there was no significant change from end of treatment to follow-up (end $\bar{x}$ = 16.68, sd = 7.54; follow-up $\bar{x}$ = 19.73, sd = 8.95) (t (10) = -1.38. p = .20).

Fig 4: Number of hours spent in sedentary behaviours per week at start, end and follow-up of treatment



Further examination of the data was conducted to explore any possible differences in levels of sedentary behaviour between weekdays and weekends. This revealed that there was a significantly greater number of hours spent in sedentary behaviours on weekend days compared to weekdays at the start of treatment (weekday $\bar{x}$ = 2.58, sd = 1.21; weekend $\bar{x}$ = 4.89, sd = 3.13) (t(31) = 5.01, p<.001)[2]. This was confirmed at the end of treatment (weekday $\bar{x}$ = 1.93, sd = .98, weekend $\bar{x}$ 3.88, sd = 1.95) (t (22) = 5.95, p<.001) and at follow-up (weekday $\bar{x}$ = 2.12, sd = 1.07; weekend $\bar{x}$ = 3.85, sd = 2.26) (t(12) = 3.47, p = .01) (see figure 4).

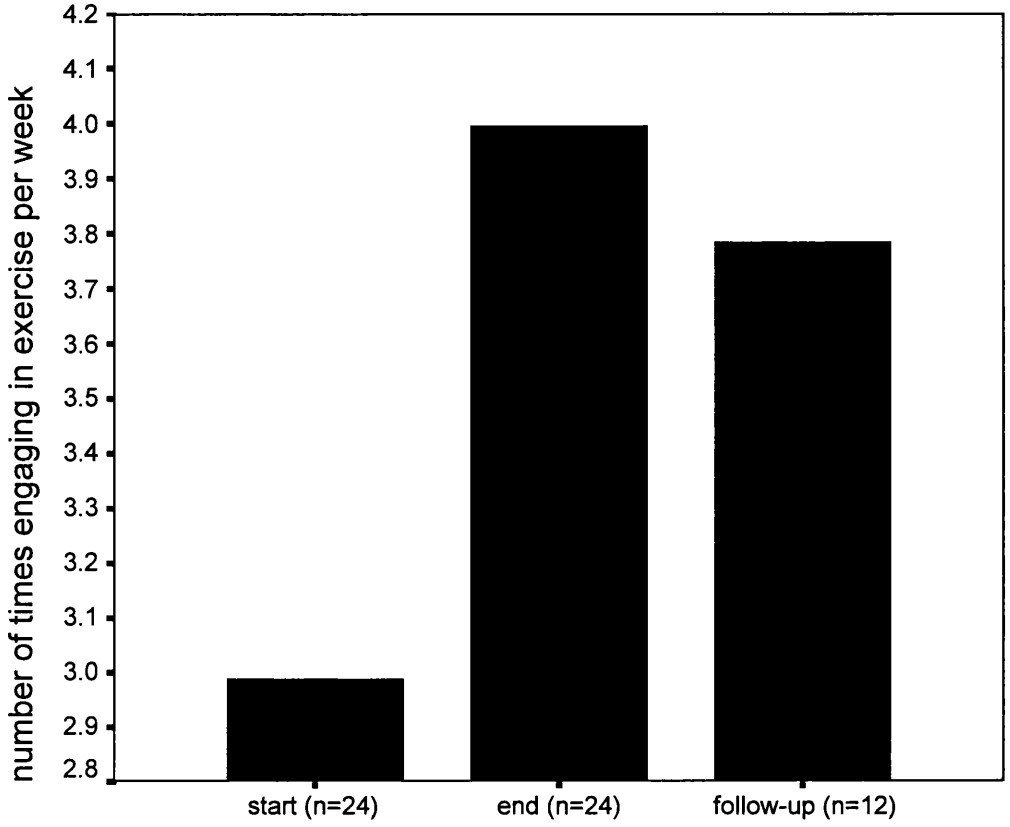
[2] This analysis was based on 33 children, and figures therefore differ slightly from the analysis of total sedentary behaviour between start and end of treatment, which is based on 23 children).

3.5.2 Changes in physical activity

Parents were also asked how many times a week their child participated in sports or other physical activity, which involved "getting out of breath or making him/her sweat". As would be expected from the reduction in sedentary behaviour, there was a significant increase in activity levels between the start and end of treatment ($t(23) = 4.15$, $p < .001$). As figure 5 below illustrates, children reported spending an average of nearly three times per week exercising at the start of treatment, but increased this by almost 1 ½ sessions by the end of treatment (start $\bar{x} = 2.99$, sd = 2.22; end $\bar{x} = 4.40$, sd = 2.05).

Although there was a slight decrease in activity levels between the end of treatment and at follow-up, this was not a statistically significant reduction (end $\bar{x} = 4.46$, sd = 2.19; follow-up $\bar{x} = 3.79$, sd = 2.15) ($t(11) = .73$, $p = .48$).

Fig 5: Number of times spent exercising per week at start, end and follow-up of treatment



3.6 CHANGES IN EATING ATTITUDES

3.6.1 Changes in eating attitudes between pre and post intervention and post intervention and follow-up

In order to assess whether the treatment had any negative effect on children's eating attitudes, in particular attitudes linked to dieting, bulimia and oral control, the Children's Eating Attitude Test (ChEAT) was administered. Overall, there was an increase approaching significance on the ChEAT total score between the start of treatment and the end of treatment ($t(24) = -1.97$, $p = .06$). In contrast, between end of treatment and follow-up this score significantly decreased ($t(14) = 2.36$, $p = .03$).

More specifically, as can be seen from Tables 4 and 5, children were more likely to report dieting at the end of treatment compared to the start of treatment (end $\bar{x}$ = 12.04, sd = 5.99; start $\bar{x}$ = 9.92, sd = 6.04). This increase was approaching significance (t(24) = 2.01, p = .06). To explore this more fully individual items comprising this scale were examined in more detail. This revealed that children were more likely to report that they 'stay away from foods with sugar in them', 'eat diet foods' and 'had been dieting'(all ps < 0.05) at the end of treatment.

Dieting behaviour reduced again between the end of treatment and follow-up with the difference approaching significance (end $\bar{x}$ =12.87, sd = 6.40; follow-up $\bar{x}$ = 10.33, sd = 5.26) (t(14) =1.95, p = .07).

With respect to the bulimia scale, there was no significant difference in attitudes reported either between start and end of treatment (t(24) = .18, p=.86), or between the end of treatment and follow-up(t(14) =1.6, p= .13).

Similarly, on the oral control scale there were no significant changes between start and end of treatment (t(24) = -1.66, p =.11), and between end of treatment and follow-up (t(14) = 1.43, p = .18).

Table 4: Mean scores on ChEAT subscales at start and end of treatment

	Start of treatment (n = 25)	End of treatment (n = 25)
Scale:	Mean (SD)	Mean (SD)
ChEAT total score	14.20 (8.58)	17.12 (8.42)
Dieting	9.92 (6.04)	12.04 (5.99)
Bulimia	2.08 (2.94)	2.00 (2.58)
Oral control	2.20 (2.69)	3.08 (2.29)

Table 5: Mean scores on ChEAT subscales at end of treatment and follow-up

	End of treatment (n = 15)	Follow-up of treatment (n = 15)
Scale:	Mean (SD)	Mean (SD)
ChEAT total score	18.73 (9.79)	14.33 (7.83)
Dieting	12.87 (6.40)	10.33 (5.26)
Bulimia	2.53 (3.00)	1.73 (2.49)
Oral control	3.33 (2.79)	2.27 (2.76)

3.7 CHANGES IN PARENTAL FEEDING STYLE

3.7.1 Changes in parental feeding style

In order to assess changes in parental feeding style, parents completed the Parental Feeding Style Questionnaire (PFSQ). In particular, instrumental use of food, emotional use of food, encouragement to eat and parental control over eating were examined.

All aspects of parental feeding style changed significantly during the course of treatment (see Tables 6 and 7 and Figure 6). Parents reported to be using significantly less instrumental use of food at the end of treatment, in comparison to the start of treatment ($z = -2.45^a$; $p = .01$). Although scores reverted to pre-treatment levels at follow-up, this was not statistically significant ($z = -.69^b$; $p = .49$). Furthermore, parents significantly reduced the emotional use of food between the start and end of treatment ($z = -2.76^a$; $p = .01$). Scores increased to above pre-

[a] based on positive ranks
[b] based on negative ranks

treatment levels at follow-up, but again this change was not statistically significant (z = -.83[b], p = .41).

In contrast, encouragement to eat significantly increased at the end of treatment (z = -3.55[b]; p < .001) and was maintained at follow-up (z = -1.50[a]; p = .14). Parental control over eating increased significantly between the start and end of treatment (z = -2.62[b]; p = .01) and this was also maintained at follow-up (z = -1.02 [a]; p = .31).

Fig 6: Parental feeding style subscales at start, end and follow-up

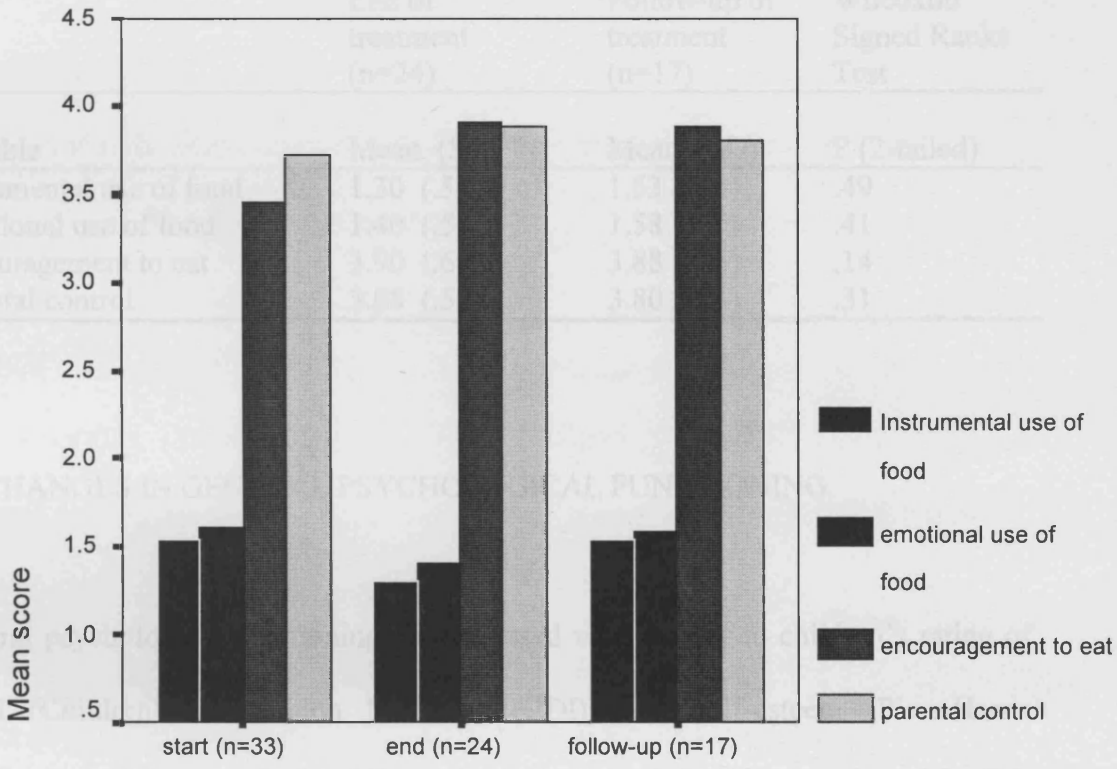


Table 6: Changes in parental feeding style between start and end of treatment

	Start of treatment (n=33)	End of treatment (n=24)	Wilcoxon Signed Ranks Test
Variable	Mean (SD)	Mean (SD)	P (2-tailed)
Instrumental use of food	1.53 (.62)	1.30 (.50)	.01**
Emotional use of food	1.60 (.67)	1.40 (.58)	.01**
Encouragement to eat	3.45 (.74)	3.90 (.69)	<.001**
Parental control	3.72 (.48)	3.88 (.50)	.01**

** = significant at p < .01

Table 7: Changes in parental feeding style between end of treatment and follow-up

	End of treatment (n=24)	Follow-up of treatment (n=17)	Wilcoxon Signed Ranks Test
Variable	Mean (SD)	Mean (SD)	P (2-tailed)
Instrumental use of food	1.30 (.50)	1.53 (.64)	.49
Emotional use of food	1.40 (.58)	1.58 (.65)	.41
Encouragement to eat	3.90 (.69)	3.88 (.85)	.14
Parental control	3.88 (.50)	3.80 (.44)	.31

3.8 CHANGES IN GENERAL PSYCHOLOGICAL FUNCTIONING

General psychological functioning was assessed with respect to children's rating of mood (Children's Depression Inventory (CDI)) and Self-esteem (Piers-Harris Children's Self Concept Scale (PH) total score). One of the six subscales of the PH: physical appearance and attributes, was also examined further. General difficulties as rated by the parents were assessed with the Strengths and Difficulties Questionnaire (SDQ) total score.

3.8.1 Mood

The CDI allows for t-scores to be categorised into one of nine categories ranging from 'very much below average' to 'very much above average'. The category of 'average' ranges from 45 to 55. Although the majority of children in this study scored in the 'average', and therefore non-clinical range on the CDI, both at the start and end of treatment, there was a significant reduction in reported symptoms of negative mood (start $\bar{x}$ = 49.77, sd = 11.19; end $\bar{x}$ = 44.48, sd = 7.89) (t(24) = 3.84, p = .001). Scores between the end of treatment and follow-up did not significantly change and therefore this reduction was maintained at follow- up.

3.8.2 Self-esteem

Scores on the PH were converted into t-scores. Typical t-scores on the PH would fall between 40 and 60, with a mean score of 50.

Children's self-esteem improved significantly between the start and end of treatment (start $\bar{x}$ = 52.04, sd = 8.44; end $\bar{x}$ = 56.28, sd = 10.85), (t(24) = 2.86, p = .01) (see Tables 8 and 9). However, in contrast to other changes achieved during treatment, improvements made with respect to self-esteem were not only maintained, but continued to improve significantly between the end of treatment and follow-up (end $\bar{x}$ = 54.80, sd = 12.79; follow-up $\bar{x}$ = 60.07, sd =10.87), (t(14) = 2.74, p = .02).

One of the sub-scales of the PH assesses self-perception of physical appearance. As this construct has been found to be of importance in obese individuals, this scale was examined in more detail. As would be expected, self-perception of physical appearance improved significantly between the start and end of treatment (start $\bar{x}$ =

46.92, sd = 7.72; end $\bar{x}$ = 49.92, sd = 9.79) (t(24) = -2.24, p = .03). Furthermore, children's perception of their physical appearance continued to improve significantly at follow up (t(13) = -3.51, p = .01).

3.8.3 Parental report of general difficulties

There was also a significant decrease in parents report of children's emotional and behavioural difficulties using the SDQ, between the start and the end of treatment (start $\bar{x}$ = 13.04, sd = 5.86; end $\bar{x}$ = 10.04, sd = 5.06) (t(22)= 3.14, p = .01). Whilst there was a slight increase in reported difficulties between the end of treatment and follow-up this was not statistically significant (end $\bar{x}$ = 9.50, sd = 5.66; follow-up $\bar{x}$ = 11.33, sd = 5.11).

Table 8: Summary of changes in general psychological functioning between start and end of treatment

	Start of treatment (n=25)	End of treatment (n=25)	T-Test
Variable	Mean (SD)	Mean (SD)	P (2-tailed)
Mood[4]	49.77 (11.19)	44.48 (7.89)	.001**
Self-esteem[5]	52.04 (8.44)	56.28 (10.85)	.01*
Self-perception of physical appearance[6]	46.92 (7.72)	49.92 (9.79)	.03*
Difficulties[7]	13.04 (5.86)	10.04 (5.06)	.01*

** = significant at p < .01 , * = significant at p < .05

[4] Assessed by Children's Depression Inventory (CDI), values reported are t-scores

[5] Assessed by Piers-Harris Children's self-concept scale total score

[6] Assessed by Piers-Harris Children's self-concept scale physical appearance scale

[7] Strengths and Difficulties Questionnaire (SDQ) total score (start = 24 , end = 24)

Table 9: Summary of changes in general psychological functioning between end of treatment and follow-up

	End of treatment (n=15)	Follow-up of treatment (n=15)	T-Test
Variable	Mean (SD)	Mean (SD)	P (2-tailed)
Mood[4]	46.53 (8.63)	45.53 (8.27)	.52
Self-esteem[5]	54.80 (12.79)	60.07 (10.87)	.02*
Self-perception of physical appearance[6]	50.86 (11.53)	51.93 (10.99)	.01*
Difficulties[7]	9.50 (5.66)	11.33 (5.11)	.16

* = significant at $p < .05$
[4] Assessed by Children's Depression Inventory (CDI), values reported are t-scores
[5] Assessed by Piers-Harris Children's self-concept scale total score
[6] Assessed by Piers-Harris Children's self-concept scale physical appearance scale
[7] Strengths and Difficulties Questionnaire (SDQ) total score (end n= 13, f-up n=13)

To explore possible relationships between changes in children's %BMI and child rated changes in psychological functioning, two correlational analyses were carried out on the end of treatment scores with respect to mood and self-esteem. This revealed that changes in %BMI were not significantly related to changes in mood ($r = -.327$, $p = .357$), or changes in self-esteem ($r = .108$, $p = .608$).

CHAPTER 4

DISCUSSION

After a summary of the main findings, this chapter will start with a discussion of changes in adiposity on completion of and at three months follow-up of the intervention. This is followed by an examination of changes in eating behaviours and levels of activity. Changes in eating attitudes, parental feeding style and psychological functioning are then explored in turn. Following this, the representativeness of the sample will be considered. Limitations of the study, implications for future research and clinical practice will then be discussed.

4.1 OVERVIEW

The aim of the present study was to examine the effectiveness of a family based behavioural treatment for childhood obesity in a UK clinical sample with a non-randomised comparison group. In addition to weight change, changes in eating behaviours, levels of activity, eating attitudes, parental relationship to child's eating and psychological functioning were assessed. The findings were consistent with previous research, supporting the hypothesis that FBBT is effective in achieving significant reduction of adiposity, which was maintained at short term follow-up.

The main findings are summarised as follows:

1) Children in the 'control group' showed no change in adiposity during the three months no intervention phase. Children in the intervention group had a significant reduction of adiposity at the end of treatment and were able to

maintain this at three months follow-up. These findings were replicated with an intention to treat analysis.

2) Parents reported that children were eating significantly less 'red' foods and significantly more 'green' foods following treatment. There was a significant increase in consumption of both food groups at three months follow-up compared to the end of treatment. With respect to eating behaviours, there was a significant decrease in food responsiveness (eating in response to external cues) and a significant increase in levels of satiety responsiveness (regulating the amount of food eaten in response to satiety cues) between the start and end of treatment. Levels of eating in response to emotional states did not significantly change during treatment. None of these variables changed significantly between end of treatment and follow-up.
3) There was a significant reduction in parental reports of sedentary behaviour between the start and end of treatment, and no significant change between the end of treatment and follow-up. Significantly more time was spent in sedentary behaviour over weekends than during weekdays. Parents reported that levels of activity increased significantly during treatment, with no significant changes at follow-up.
4) With respect to the total eating attitudes score, there was a trend, though not statistically significant, for higher scores at the end of treatment. In particular, higher levels of dieting were reported, approaching significance, during treatment. At three months follow-up there was a significant reduction in the total eating attitudes score with a reduction in dieting behaviours, again approaching significance. There were no significant changes on the bulimia and oral control sub-scales either during treatment or at follow-up.

5) Assessment of aspects of parental feeding style revealed that instrumental use of food (i.e. using food as a reward) and emotional use of food (i.e. giving the child food in response to low mood) significantly decreased during treatment, whereas encouragement to eat (i.e. praising the child for eating) and parental control over eating (i.e deciding how much the child eats) significantly increased. All of these changes were maintained at follow-up.
6) Although mean scores on all measures of psychological functioning were within the non-clinical range at the start of treatment, there was a significant improvement in child's report of mood, self-esteem and self-perception of physical appearance at the end of treatment. Furthermore, parents reported a significant reduction in general difficulties as assessed by the Strengths and Difficulties Questionnaire total score. Changes in general difficulties and mood were maintained at three months follow-up. In contrast, changes in self-esteem and self-perception of physical appearance, as reported by the parents, continued to improve significantly at three months follow-up.
7) Changes in adiposity at the end of treatment were not related to improvements in mood or self-esteem.

4.2 FINDINGS

4.2.1 Changes in adiposity

There was a significant reduction in mean adiposity between the start of treatment and three months follow-up for those children who completed the treatment and attended for follow-up. Post hoc analyses revealed that there was a significant reduction between the start and end of treatment, with weight change being

maintained at three month follow-up. These findings were replicated using intention to treat analysis, where missing data for height and weight was replaced by measurements taken at an earlier time point, suggesting that attrition did not affect treatment outcome. This supports previous findings reporting that FBBT is effective in achieving weight loss and seems to be superior to no treatment (Epstein et al, 1981; Epstein et al, 1994; Epstein et al, 1995). However, although changes in the intervention group were compared to the wait-list control group it has to be borne in mind, that a direct comparison between a treatment and no-treatment condition was not carried out in this study. Therefore, although the relationship between the intervention and changes in outcome variables can be speculated on based on the present and previous findings, conclusion about causality with respect to such variables have to be drawn with caution.

Mean reduction of overweight in the present study was 9.63% BMI between start and end of treatment, and 10.03% BMI between start of treatment and follow-up. In comparison to previous research, which reported average reduction of overweight by 17% (Epstein, 1994), this represents a smaller effect. One of the reasons for this difference might be that previous studies were carried out in a research setting, whereas the present study was based on a clinical sample. Furthermore, previous studies (Epstein et al, 1994) have included only children living in 'intact' families, which may have improved treatment outcome. In addition, range of overweight at the start of treatment in the study reported by Epstein et al. (1994) was lower (113.7 – 149.9 %BMI) compared to the present study (137.8 – 256.7 %BMI). Levine (2000) found that reduction in adiposity following FBBT in a group of severely obese children (≥160% ideal body weight) was 11.3%, which may suggest that weight

changes in more obese children are likely to be smaller. Furthermore, as it has previously been suggested that weight loss of 5-10% may lead to reduced health risks (Treatment and Prevention, ASO, 1997), children in the present study may still experience benefits through the reduction in overweight they achieved.

Children assigned to the three months 'no intervention' control group showed no significant change in adiposity during this period. This supports the idea that significant weight loss would not have occurred in the present sample without intervention. Previous studies reported that 8-12 year old children at the 95th centile for body weight gain 5-7 kg annually (Hamill et al, 1979, cited in Levine, 2001). This further supports the notion that obese children tend to undergo gradual weight increase without intervention. It is likely that no change in weight rather than weight gain for children in the control period in this sample was due to a relatively short control period of three months. On the other hand, reflecting on their weight status during the assessment and the knowledge that they were awaiting intervention may have increased children's' motivation to lose weight. This may have led to changes in weight related behaviours leading to weight maintenance rather than weight gain during the control period. However, although it had been envisaged that a control group equal in size to the intervention group would be included in this study, this was not possible due to the small number of referrals. The small sample size in the control group is therefore likely to have reduced statistical power and this has to be borne in mind in evaluating differences between the intervention and control period.

Although follow-up data was only available for a three month period, results of the present study support previous findings, suggesting that reduction of adiposity

following FBBT can be maintained at follow-up (Epstein et al, 1994, Levine, 2000). Children in the general population are expected to continue to gain weight and grow until their late teens. Therefore, if weight maintenance was achieved in the long-term in the present sample, with continuing height increases, this would lead to a gradual further reduction in adiposity. This would be of particular importance, given that although levels of overweight were significantly reduced, all children in this study remained obese at the end of treatment. Although Epstein et al. (1994) previously reported that 30% of children undergoing FBBT reach non-obese status at 10 year follow-up, it is not known whether such changes can be directly attributed to the intervention.

The fact that maintenance, rather than continued reduction of adiposity, was found at follow-up suggests that children need to be in active treatment to achieve a reduction in degree overweight. This may be explained by a number of reasons. Firstly, the intervention requires families to make a number of significant changes to their diet and life-style which require considerable time, effort and commitment. Families may require continued support and input provided by the intervention in order to carry out these changes. This is reflected by the fact that most forms of FBBT have tended to include monthly follow-up support for up to 12 months from the end of treatment, as opposed to one follow-up session at three months post treatment as in the present study (Epstein et al., 1994). Secondly, families may have been socialised into associating weight loss with discrete periods of 'dieting' rather than permanent life-style changes. Gains made during the active phase of the intervention may therefore only be maintained rather than further improved on. However, in view of the fact that

as mentioned above, continuous weight gain is likely to occur in obese children, the maintenance of weight status achieved in this study is a key finding.

In summary, the present study has confirmed that FBBT is successful at achieving significant reduction of adiposity in obese children and that these changes can be maintained at three month follow-up.

4.2.2 Changes in Diet and Eating Behaviours

4.2.2.1 Dietary changes

With respect to diet, items categorised as 'red' (high in fat and sugar) and 'green' (fruits and vegetables) foods were identified from the Food Frequency Questionnaire (FFQ) and changes in these two food groups were evaluated. Children were reported to be eating a mean of 1.4 'red' foods per week at the start of treatment, .76 'red' foods at the end of treatment and 1 'red' food per week at follow-up. This represents a significant decrease between start and end of treatment and a significant increase between end and follow-up. These findings are important, given that increased intake of energy dense foods (such as 'red' foods) has been linked to positive energy balance and weight gain (McGloin, 2002). This suggests that reducing the consumption of such foods is an effective component of FBBT. Although it is not possible to ascertain whether changes in diet have led directly to reduction in adiposity, the present findings support previous studies (Epstein, 1994) which suggest that approaches to weight loss including a dietary component are effective. It should be noted however, that levels of 'red' food consumption reported here are considerably lower than would be expected within the general population. The possibility of underreporting accounting for some of these findings needs to be borne

in mind (see section 3.2). Underreporting may be due to social desirability effects (Barker, Pistrang & Elliott, 1994), which may mean parents reported 'red' food consumption in a way they felt was expected of them or would show the child's eating behaviour in a socially acceptable light. If this was the case, it may have important implications for clinical practice. Families may for example be experiencing shame in connection with the child's weight and issues such as diet associated with obesity. Openly discussing issues related to shame is associated with improved treatment outcome in psychological therapies (Gilbert, 1998), it would therefore be important to acknowledge and address such issues in treatment. This may not only promote more accurate reporting of dietary habits, but also allow the family to be more open about feelings associated with the child's weight status. The use of food diaries is a further measure which may increase accuracy of dietary reports, and will be discussed in more detail in section 3.2 below.

Reported consumption of 'green' foods increased significantly from a mean of 2.86 foods eaten per week at the start of treatment to 3.61 at the end of treatment. It continued to increase significantly with a mean of 4.30 green foods reported to be consumed at follow-up. There was therefore a significant improvement in reported diet between the start and end of treatment. Gains made with respect to green food consumption continued to improve at three months follow-up.

Increase in 'green' food consumption was one of the main aims of the intervention, and reinforced by strategies such as praise and reward from parents as well as monitoring through weekly food records. These elements of the intervention therefore appear to have been successful. The continued increase in 'green' food

consumption at follow-up suggests that children were able to incorporate this part of the programme beyond the end of treatment. This is particularly encouraging, as the government is currently recommending that adults and children eat at least five portions of fruit and vegetables per day to improve and maintain general well-being (Balance of Good Health, Health Education Authority, 1994). Although children in this sample were still short of achieving this target and consumed considerably less than the national average of 2.5 portions of fruit and vegetables per day within their peer group (Health Survey for England, 2002), they consumed on average one and a half times their original fruit and vegetable intake at follow-up. The increase in 'red' food consumption at follow-up, however, suggests that families had difficulty consistently implementing the changes made during the treatment phase with respect to fatty and sugary foods. One reason may be that *reducing* food intake as required for 'red' food consumption might be more difficult to maintain than *increasing* food intake as required for 'green' food consumption. Furthermore, as mentioned above, families may have found it difficult to maintain these changes without the support available to them during the treatment phase. Similarly, as mentioned above, families may have viewed the intervention phase and changes to eating habits as a diet rather than permanent life-style change and see restriction of 'red' foods as a temporary measure. However, this hypothesis is not supported by the fact that 'green' food consumption continued to increase at follow-up. The relationship between treatment outcome and attitudes to dieting appear to be important in evaluating FBBT an will be discussed in more detail in section 2.3.

4.2.2.2 Changes in eating behaviours

Children's eating in response to external cues (responsiveness to food) significantly decreased between the start and end of treatment. On the other hand, children's response to (internal) satiety cues as measured by satiety responsiveness significantly increased. Treatment gains made with respect to satiety responsiveness and food responsiveness were maintained at follow-up

The present findings support the idea that FBBT is effective in changing eating behaviours related to satiety and food responsiveness. Previous research (Canetti, 2002) has suggested that obesity may be linked to increased eating in response to external cues and decreased eating in response to internal cues. This suggests that to achieve weight loss, such eating behaviours may need to be addressed in treatment. The change in satiety and food responsiveness in this study may partly have been achieved through the programme's educational component making explicit the function and effects of such eating behaviours. This component may have led to an increased awareness of satiety and reduced food intake in response to external cues, which families appear to have been able to maintain beyond active intervention. It is not possible to assess whether these factors have been instrumental in weight change in the present study. However, it is likely that reduction of eating in response to external cues, and increased awareness of internal satiety cues may have led to a decrease in excess energy intake and thereby supported reduction of overweight.

Neither increasing nor decreasing food intake in response to emotional cues as measured by emotional over- and undereating changed significantly during the treatment phase. No significant changes were observed with respect to emotional

over- and undereating at follow-up. This suggests that FBBT has not been effective in this study in changing such eating behaviours. Previous research by Braet and van Strien (1997), suggested that obesity is linked to overeating in response to emotional cues. This would imply that to achieve weight loss, such eating behaviours would have to be changed. In contrast, the findings of this study, suggest that weight loss can be achieved in obese children without changes in emotional eating.

There are, however, a number of alternative explanations for these findings. Studies on emotional eating and obesity have largely focused on the adult population. As it has been postulated that emotional over- and undereating are learned behaviours (Canetti 2002) such patterns may not have been established yet during childhood. Therefore children in the present sample may not have had changes in emotional eating as such behaviours may not have been established. A further explanation for the present findings may be that emotional overeating contributes to obesity only in a sub-sample of the obese population. It is not known whether levels of emotional eating were different in children participating in this study from non-treatment seeking obese children or non-obese children. It would therefore be of benefit to compare levels of emotional eating amongst different child populations including obese and non-obese children in future studies. It is also possible that the small sample size may have resulted in a lack of statistical power and therefore not detected potential changes.

In summary, the present findings suggest that FBBT was effective in changing dietary habits and eating behaviours with respect to satiety responsiveness and food

responsiveness. However, changes in emotional over- and undereating were not observed.

4.2.3 Changes in physical activity and sedentary behaviour

4.2.3.1 Sedentary behaviour

The amount of time spent engaged in sedentary pursuits reduced significantly between the start and end of treatment, and this reduction was maintained at follow-up. Almost double the time was spent in sedentary behaviour over weekend days than on weekdays, at start, end, and follow-up of treatment. These findings support previous research suggesting that programmes in which sedentary behaviour is decreased and levels of physical activity are increased are effective in achieving weight loss (Epstein et al, 1994). Children were set a specific target of spending no more than two hours per day in sedentary pursuits including watching TV and playing computer games. Reductions in sedentary behaviour were supported by activities such as goal setting and reinforced through praise and reward by parents and group facilitators. A target of spending no more than two hours per day in sedentary pursuits was set for the children at the start of the intervention. The finding that sedentary behaviour reduced from an average of 25.7 hours per week (3.67 hours per day) at the start of treatment to an average of 17.43 hours per week (2.59 hours per day) at the end of treatment suggests, that although this target was not met, techniques used in the intervention were nevertheless effective in reducing sedentary behaviour. These results are encouraging as increased levels of exercise have generally been associated with health-benefits (Summerbell, 2003) and may be vital in counteracting health risks associated with obesity. Although individual mechanisms of change have not been assessed in this study, increased levels of

activity are likely to have contributed to the reduction in adiposity achieved at the end of treatment and maintenance of weight status at follow-up. Furthermore, the reduction of sedentary behaviours has previously been shown to be effective in achieving weight loss (Epstein et al, 1994). This suggests that the reduction of sedentary behaviour during the treatment phase of this study is likely to have contributed to reduction in adiposity. Continued lower levels of sedentary behaviour at follow-up in turn may have contributed further to maintaining treatment gains made with respect to reduction of adiposity.

The finding that children engaged in significantly more sedentary behaviours at weekends than on weekdays may be due to the lack of structured activities provided over weekends. This may suggest that future treatments need to focus on supporting families in reducing sedentary behaviour, with particular emphasis placed on weekends. It should be noted that the questionnaire asked about sedentary behaviours only in relationship to television and video viewing as well as playing computer games, but did not assess sedentary behaviour such as sitting down in a class-room for example. The present findings may therefore simply reflect the fact that children have more opportunity for playing computer games and watching TV on weekends compared to weekdays. The difference in sedentary behaviour between weekend days and weekdays may be less marked if sedentary behaviour in the form of sitting was evaluated. .

4.2.3.2 Physical activity

Activity levels increased significantly between the start and end of treatment, with parents reporting their children to be engaged in physical activity nearly three times

per week at the start of treatment. This increased by nearly 1 ½ sessions at the end of treatment, with the increase maintained at follow-up. These results therefore support the hypothesis that FBBT was successful in increasing activity levels and decreasing sedentary behaviours in this study. The increase in physical activity levels may have been linked to the programmes' explicit aim to increase life-style exercise in the form of walking, and to give positive reinforcement for such behaviour. However, the actual type and number of hours spent in physical activity was not assessed in this study, and it is not known whether the increase in physical activity reported by parents is an increase in walking.

The relationship between reduction in sedentary behaviour and increase in physical activity has not been examined in this study. However, previous studies (Epstein et al, 1997) have shown that positive reinforcement for reduction of sedentary behaviour increases activity levels, without targeting such behaviour. This suggests that increase in activity levels in this study may have been further enhanced by reduction of sedentary behaviour, as children may have sought alternative activities to TV viewing and computer usage. Increased levels of physical activity are not only important as they may support weight loss (Epstein et al., 1982), but also as increased levels of exercise has been linked to improvements in physical health, including decrease in blood pressure (WHO, 1998) and coronary heart disease (Dubbert, 1992). Therefore , increased levels of physical activity may be of particular importance for children in the present study, as they may negate some of the adverse health effects associated with obesity.

In summary, the present findings suggest that children attending FBBT in this study show significantly decreased sedentary behaviours during the course of the intervention, whilst levels of physical activity significantly increased, with both treatment gains maintained at follow-up. Significantly more time was spent in sedentary behaviour over weekends compared to weekdays.

4.2.4 Changes in Eating Attitudes

Eating attitudes as assessed by behaviours consistent with dieting, bulimia and oral control were assessed by self-report on the Children's Eating Attitude Test (ChEAT). Although attitudes related to disordered eating slightly increased between the start and end of treatment overall, there was no significant difference in the total score. Overall disordered eating attitudes decreased significantly between end of treatment and follow-up, but did not reduce below pre-treatment levels. In contrast, reported behaviours indicating bulimia or oral control did not change significantly between start and end of treatment or end of treatment and follow-up. However, dieting behaviours increased, approaching significance, between the start and end of treatment and decreased, with the difference approaching significance, at the end of treatment. When examined in more detail, items on the dieting scale stating that the child 'stays away from foods with sugar in them', 'eats diet foods' and 'has been dieting' increased significantly during treatment and decreased significantly at follow-up. These findings therefore suggest that FBBT did not increase behaviours associated with oral control and bulimia in the present sample, but resulted in a considerable, though not significant increase in dieting behaviour.

The finding that behaviours linked to diet increased during the treatment phase is not surprising, given that families are asked specifically to make changes to their diet with respect to 'red' and 'green' food consumption. Although the emphasis is on permanent life-style changes and recommendations for dietary changes are in line with the 'Balance of Good Health' (Health Education Authority, 1994), these findings lend additional support to the hypothesis discussed above that families perceive themselves to be on a 'diet'. This is further supported by the finding that dieting behaviour significantly decreased between the end of treatment and follow-up, suggesting that dieting behaviour reduced on completion of the intervention.

As attempts at weight loss have been associated with increased eating pathology (Striegel-Moore, 2001) it is vital to ensure that approaches to the management of paediatric obesity, including the intervention evaluated here, do not lead to an increase in behaviours consistent with disordered eating. The present findings of no change on the oral control and bulimia subscale support previous research stating that FBBT is not linked to increased eating pathology (Epstein et al, 2001; Levine et al, 2001), both at the end of treatment and at follow-up.

As the main aim of this study was to evaluate the effectiveness of FBBT on a UK sample it did not explore gender differences in relation to changes in eating attitudes following FBBT. Epstein (2001) however, reported that although overall there is no increase in eating pathology following FBBT, when examined by gender, boys are more likely to show an increase in eating pathology following FBBT than girls. This suggests that future studies should examine whether the intervention has a differential impact in boys compared with girls in UK samples. Furthermore,

although there is support from Epstein to suggest that FBBT does not result in increased eating pathology at two year follow-up, eating pathology between obese children undergoing FBBT and obese children who do not receive treatment have not been previously compared. It has been suggested that, as there is an increased incidence of eating disorders amongst obese individuals (Wyatt & O'Hill, 2000), FBBT may help to prevent such disorders by means of giving mechanisms of controlling weight other than bingeing and purging (Epstein et al, 1994). There would therefore be benefit in addressing this issue in future research.

In summary, children attending FBBT in the present sample showed no changes in behaviours linked to disordered eating as measured by oral control and bulimia at the end of treatment or follow-up. Dieting behaviour however, increased between the start and end of treatment and decreased between the end of treatment and follow-up, with the difference approaching significance at both points of assessment.

4.2.5 Changes in parental feeding style

Parental relationship to child's eating was assessed through the Parental Feeding Style Questionnaire (PFSQ). There was a significant reduction between the start and end of treatment in parents' use of food as a reward (instrumental use of food) and use of food in response to negative emotion (emotional use of food). Although these behaviours returned to pre-treatment levels or above at follow-up, this increase was not statistically significant. The role of parental feeding styles in FBBT has not been previously assessed. However, there is evidence to suggest that inclusion of parents in FBBT is superior in achieving weight loss than intervention aimed at the child alone (Epstein, 1994). Changes in parental feeding styles may contribute to weight

loss in a number of ways. For example, it has previously been suggested that instrumental and emotional use of food may be implicated in increased levels of obesity as they may encourage the child to eat for reasons other than hunger, and thereby increase the risk of eating in excess of physiological need (Wardle et al, 2002). The present findings of a reduction in both these behaviours, may therefore have helped to create an environment which encourages the child to eat in response to satiety cues and limit food intake prompted by external factors, which is thought to lead to a reduction in BMI. The finding that changes in instrumental and emotional use of food did not change between end of treatment and follow-up suggests that such treatment gains can be maintained and are likely to continue to support weight maintenance.

However, although changes in instrumental and emotional use of food at follow-up were not statistically significant, they appear to have returned to pre-treatment levels. This may be due to the sample size at follow-up being smaller than at the end of treatment, which is likely to have reduced statistical power. If this was true and changes in instrumental and emotional use of food had actually reverted to pre-treatment levels it could be concluded that such feeding styles may be entrenched in general parenting practices and therefore more difficult to change persistently.

Encouragement to eat and parental control over eating significantly increased between the start and end of treatment. These behaviours were maintained at follow-up. Together with changes in instrumental and emotional use of food, these findings suggest that there was a change in parental feeding style following FBBT in parents of children in the present sample.

The finding that parental encouragement to eat increased significantly seems surprising, given that families were asked to reduce intake of 'red' foods. However, the intervention prescribed no limit on overall food intake and a balanced diet was promoted instead. It is therefore possible that an increase in encouragement to eat may reflect an increase in encouragement to eat nutritious foods. In fact closer examination of the 'encouragement to eat' subscale reveals that it consists of items such as " I praise my child when she eats what I give her". Such behaviour would be consistent with parenting techniques of positive reinforcement as advocated by this intervention if applied to a healthy diet.

Previous studies have suggested that increased parental control has been associated with a decrease in BMI (Robinson, 2001). Although the present study has not examined this relationship directly it is possible that changes in parental feeding style, including increased parental control over eating, have contributed to the reduction in adiposity. Such an association could be due to control of portion size and foods available to the child as is advocated by the intervention.

In summary, the present findings suggest that parents attending FBBT with their child show significantly decreased levels of instrumental and emotional use of food, and significantly increased use of encouragement to eat and parental control at the end of treatment. These treatment gains are apparently maintained at follow-up.

4.2.6 Changes in general psychological functioning

There was a significant improvement in child reports of mood (assessed through the Children's Depression Inventory), self-esteem and self-perception of physical appearance (both assessed on the Piers-Harris Children's Self-Concept Scale) between the start and end of treatment. In addition there was a significant reduction in general difficulties as assessed by parental completion of the Strengths and Difficulties Questionnaire (SDQ) total score. Changes in general difficulties and mood were maintained and changes in self-esteem and self-perception of physical appearance continued to improve significantly at three months follow-up. These findings therefore support the hypothesis that there is an improvement in general psychological functioning for those children who completed treatment.

The present finding that mood significantly improved during the course of treatment, but did not correlate with weight change, supports previous research by Levine (2001). One of the reasons mood may have improved during treatment, with improvements maintained at follow-up, may be the experience of participating in a group with children with similar difficulties and the support that would provide. Puhl and Brownell (2003) have highlighted the levels of stigmatisation and social exclusion that obese individuals are often exposed to. If children participating in this study have had such experiences within their social environment in the past, attending a group which provides a supportive environment may have led to improvements in mood. However, children's experiences of attending the group were not assessed in this study. To explore the possible secondary gains and experience of FBBT, further research would be indicated.

Changes in adiposity at the end of treatment were not related to child rated improvements in psychological well-being as assessed by mood and self-esteem. This suggests that improvement in mood is unlikely to be due to weight loss or changes in physical appearance. It has previously been suggested that low mood is linked to overeating in an attempt to improve mood (Braet & van Strien, 1997). Improved mood may therefore reduce the likelihood of eating in response to negative emotional states. This suggests that, although improved mood was not related to reduction of overweight, such changes may nevertheless support weight maintenance.

The effects of FBBT on self-esteem and self-perception of physical appearance have not been previously assessed. However, the present findings suggest that FBBT has been effective in improving both these variables in the present sample of obese children by the end of treatment, and that these variables continued to improve at follow-up. Self-esteem in obese children has previously been linked to perception of body-image (Wardle & Marsland, 1990). The fact that changes in self-esteem were not linked to changes in adiposity in the present study suggests that improvement in self-esteem is unlikely to be due to actual weight loss. The reasons for improvements in self-esteem and self-perception of physical appearance may be similar to those for improvements in mood. It is possible that regular attendance of a group with other children who are overweight may have helped to normalise perception of physical appearance. This is particularly likely as other children in the group would have had more similar body-shapes than children within the general population. Furthermore, the element of positive reinforcement within the intervention which was practised both by group-facilitators and taught to parents, may have led to an increase in

positive experiences for the children which could have led to an improvement of self-esteem. The fact that these gains were further improved on at follow-up suggests that mechanisms of change may have been present outside the group setting, further supporting the idea that parents may have been instrumental in this improvement. However, it needs to be born in mind, that although there was a statistically significant improvement with respect to mood and self-esteem between the start and end of treatment, this improvement may not have been clinically significant. More specifically the reduction in scores on the CDI and the Piers-Harris Children's Self-Concept Scale may be due to external factors such as repeated assessment rather than reflecting an actual, clinically significant improvement of mood and self-esteem.

The findings of the present study may also have implications for the future development of self-esteem and body image in children participating in FBBT. Obese children have previously been found to be more likely to have negative self-esteem than non-obese children (Braet, Mervielde & Vandereycken, 1997.) Furthermore, adolescence is thought to be a critical time for the development of body-image (Jelalian, 1999). Therefore improving self-esteem and happiness and satisfaction with physical appearance in pre-adolescent obese children may serve a protective function against the development of such concerns. To ascertain such a protective function further research into the development of self-esteem and body-image in adolescents who underwent FBBT in childhood would be needed.

An area of research that has received little attention to date is that of the impact of FBBT on general psychological functioning and difficulties. Previous research by Epstein et al (1994), found that children who had higher levels of psychopathology

(as assessed by the Child Behaviour Checklist; Achenbach, 1991) were less successful at weight loss and long-term weight maintenance. It was therefore thought that the effect of FBBT on such behaviours would be an important aspect of evaluating the programme. The SDQ, which was used to assess general psychological difficulties in this study consists of subscales comprising areas of conduct problems, hyperactivity – inattention, emotional symptoms, peer problems, and prosocial behaviour. The reason for the reduction of general difficulties in the present study may again be linked to changes in parental management and techniques such s positive reinforcement, which in turn affect the child. Epstein (1994) found that psychopathology was unrelated to child's degree of obesity, but was related to parental psychological distress. Although FBBT does not set out explicitly to deal with parenting issues related to behavioural difficulties, some of the components, such as praise and reward and positive reinforcement are akin to techniques used in parenting programmes, such as the Webster-Stratton programme (Webster-Stratton & Herbert, 1994). It is therefore possible that improved parenting skills may have resulted in a reduction of general difficulties within the child. This would support the finding that improvements were maintained at follow-up, as parents may have continued to implement the new parenting skills they have acquired. Such gains would be of particular interest for further research as it has recently been shown that there is an increased incidence of behavioural difficulties, including conduct disorder amongst obese children (Mustillo et al, 2003), who may therefore benefit from changes in parenting skills.

It should be noted that children in the present sample did not score in the clinical range on measures of psychological functioning at any of the time points assessments

were carried out, which is contrary to previous findings. Previous studies suggest there is increased psychopathology in obese individuals attending for treatment. Epstein (1994) for example, reported that 11.6% of children attending for FBBT were found to present with symptoms of depression at the start of treatment. The lack of such a presentation in the present study is likely to be due to the fact that children with psychiatric difficulties were specifically excluded from the study. The effect of FBBT on mood in a sample of children including those with increased levels of psychopathology would therefore be of value, as it is this group of obese children who would particularly benefit from treatment which is likely to result in improvement in psychological variables.

4.2.7 Representativeness of the sample

4.2.7.1 Demographic variables

Families participating in the present study came from a range of ethnic and socio-economic backgrounds. One of the shortcomings of previous outcome studies on FBBT by Epstein (1994) have been that the sample was not representative of the general population as the majority of participants came from a middle-class background and were white or African American. The present study is therefore likely to add insight into the effectiveness of FBBT on children from a more varied ethnic and socio-economic background. This is particularly important as obese children are more likely to come from lower socio-economic backgrounds (Department of Health, 2004), and interventions are ideally evaluated within the client population they are intended for. Little is known about the effectiveness of FBBT amongst different ethnic groups, and this study may therefore add to further to the generalisabilty of FBBT with families from a range of ethnic backgrounds.

4.2.7.2 Mother and Child adiposity

There were no significant differences in adiposity at the start of treatment between male and female participants. Furthermore, the relationship between children's mean age at the start of the group and their adiposity was not significant. This suggests that degree of overweight was not related to age or gender in the present sample, which is representative of the general population and supports previous findings by Frelut (2003).

In comparison to the evaluation of FBBT described by Epstein (1994) the present sample included children who were more overweight. Children were on average 92.14% above their ideal body weight for age, gender and height, with a range of 37.80% – 156.7% overweight. All children had a Body Mass Index (BMI) that was >98th centile for age and sex and therefore met criteria for obesity.

The majority of mothers in the present study were overweight, which supports past research stating that obese children are more likely to have obese mothers (Whittaker et al, 1997). The mean BMI for mothers was 31.34, ranging from 19.67 to 50.75. This further supports the representativeness of the present sample compared to obese children within the general population.

4.2.7.3 Characteristics of children who did not complete the treatment

Of the 33 children who started treatment, six did not complete the treatment and including those six, thirteen did not attend for follow-up. There was no significant difference in age or weight between children who completed the treatment and drop-

outs either at the end of treatment or follow-up. Furthermore, no significant relationship between gender, and drop-out at the end of treatment or follow-up was found. Drop-out was therefore either random or related to variables not examined here.

4.3 LIMITATIONS OF THE PRESENT STUDY

4.3.1 Design of the study

Although it had been envisaged that the present study would include a randomly allocated control group equal in size to the intervention group, this was not possible due to the low number of referrals received. As a result of the small number of participants in the control group (n=6), it was not possible to compare outcome variables other than adiposity to the control sample. Consequently it is not possible to state that gains made over the intervention period are attributable to the intervention alone. Furthermore, with respect to comparisons between the control group and the intervention group regarding adiposity, the small number of children included in the control group means that statistical power is small. Although participants were allocated in order of presentation in this study, which may have limited any potential selection bias, such bias can not be ruled out due to the lack of true randomisation. This may therefore have compromised internal validity of the study. These issues could be addressed in futures studies by carrying out a Randomised Control Trial.

With respect to generalisability of the findings, little is known about differences in treatment efficacy with regards to individual differences of participants, such as ethnicity within the sample. In addition to this, inclusion criteria for the study stipulated that children with psychological difficulties could not take part. As it has

been suggested that levels of psychological disturbance are increased amongst obese individuals (Becker et al, 2001), valuable insights would be gained by establishing the efficacy of FBBT for such a population. These limitations could be addressed in future studies by comparing the efficacy of FBBT with respect to different ethnic groups and gender. This would be more likely to be achieved in a large randomised control trial as described above. Generalisability of the findings could be further enhanced by including a larger sample in such studies.

There are also a number of short-comings to outcome measures used in this study. Firstly, measures used to assess activity levels have not been validated. Although this measure appears to have face-validity, it is not known whether it is effective in assessing changes in levels of activity and sedentary behaviour in an obese sample. Secondly assessment of dietary changes was carried out using only a small number of items of the FFQ, not designed for this purpose. It is likely that these items do not represent a comprehensive list of 'red' and 'green' foods, which may have led to underreporting of consumption of such foods. Reliability of these measures may also have been compromised as there is no evidence at present documenting the accuracy of parental report of child's diet, for example. Considering that children consume increasing amounts of food outside the home (Thompson et al, 2004), parents may not be aware of their child's actual diet.

However, no adequate instruments assessing changes in activity levels and consumption of 'red' and 'green' foods for use in a paediatric obese sample have been developed at present. Furthermore, difficulties with obtaining accurate self-

report of dietary intake with alternatives such as food diaries, completed by children or parents, have previously noted (Atkinson & Nitzke, 2001).

In addition to this, Schwarz (1999), pointed out that the tool used to assess a particular construct may affect the outcome. This includes presenting participants with response scales. Schwarz argues that participants use response scales to draw information about expected and 'normal' responses. It is possible that both parent and child completion of questionnaires in this study may have been open to social desirability bias, which compromise reliability of the measures. This may have been further exacerbated by the fact that families were asked to complete questionnaires by group facilitators, with whom they may have formed a therapeutic relationship, especially after completing the intervention. This may have affected questionnaire responses as families may have wanted to 'please' facilitators and thus completed questionnaires in they way they felt was expected of them.

In order to minimise such limitations in future studies there would be benefit in developing reliable and valid assessment of activity and dietary intake with respect to 'red' and 'green' food consumption. Furthermore, the use of food diaries may produce a more accurate measure of dietary change. However, it is likely that families would require training and continuous monitoring in the use of food diaries to enhance the reliability information provided. Bias in questionnaire completion may be reduced through the addition of qualitative methods including open ended interviews.

4.3.2 The intervention

Although the version of FBBT described in this study has previously been shown to be effective in achieving weight loss (Epstein, 1994), alternative models of FBBT have also shown good outcome. For example, one area not examined in the present study is that of asking parents to aim for weight loss themselves. Recent findings (Epstein, 2004) have suggested that reduction of child's weight is dependant on reduction in parental weight. Other studies have stipulated that making the parents the sole aim of intervention is superior in achieving child weight loss than including the child in treatment (Summerbell, 2003).

4.3.3 Statistical considerations

The large number of tests conducted in the present study may have increased the risk of Type I error and positive results may have been found by chance. However, in order to reduce this risk, analyses were planned in advance, based on previous research and the hypotheses.

4.4 IMPLICATIONS FOR FURTHER RESEARCH

The present study has confirmed previous research findings suggesting that FBBT is effective in achieving weight loss in obese children. As mentioned above, further evaluation of the intervention, through an RCT within a UK clinical setting would add significantly to the generalisability of the present findings. The advantages of an RCT would be that a control group would allow for conclusion to be drawn not only as to whether treatment is effective, but also as to whether treatment is superior to a control group. Furthermore, randomisation would minimise the chance of systematic error affecting treatment outcome (Cooke & Campbell, 1979 in Barker et al 2001)

Long-term follow-up of the intervention would also be of prime importance as obesity treatments in adults have shown that although there are a number of effective interventions, maintenance of treatment outcome is poor (Garner & Woolly, 1991). It would therefore be essential to assess any long-term changes in treatments gains made as well as factors mediating such changes.

One area which has received little attention in outcome studies of paediatric obesity treatment is that of motivation. Geller et al (2004) have demonstrated that motivation to change predicts treatment outcome and attrition in inpatient based treatment of anorexia nervosa in adults. Important insights into predictors of treatment outcome in FBBT may therefore be gained by assessing motivation to change, both in parents and children, in future studies. Geller et al reported that adding a pre-treatment component which addresses motivational issues, where indicated, significantly enhances treatment outcome and reduces drop-out. If it was found that motivation to change is linked to treatment outcome in obese children, the development and evaluation of such pre-treatment components may help to increase treatment gains.

Furthermore, little research has been carried out as to which treatment components contribute directly to weight change. The use of control groups specific to individual treatment components in future studies may permit such factors to be further explored. This would allow for improvement of the intervention by maximising treatment components that are directly linked to weight change.

It would also be interesting to explore characteristics of those children who did not attend follow-up, further. One possibility for drop-out may be that children reduced

their weight status to such an extent that families felt they no longer required input from the intervention. However, the converse may be true and families may have been avoidant of attending follow-up as they may have perceived themselves to not have met treatment goals. Long-term follow-up is one of the most important outcome measures for this intervention, and such information would therefore be invaluable.

Although carried out in a clinical setting, the present study had stringent exclusion criteria to minimise variability within the sample. However, the population presenting for treatment in the health service is likely to include children with complicating factors, including social, psychological and health difficulties. It is therefore vital to assess the efficacy of FBBT in a community sample, as well as comparing treatment outcome with respect to these variables.

4.5 IMPLICATIONS FOR CLINICAL PRACTICE

The present study suggests that, FBBT is an acceptable treatment for obese children in a UK clinical population. However, in spite of emphasis on permanent life-style changes, families may be viewing the intervention in terms of a time-limited 'diet'. This suggests that families are likely to benefit from additional support in maintaining treatment gains at follow-up. This may include regular follow-up session as suggested by Epstein (1994) for up to 12 months. Supporting families for longer periods of time may allow for consolidation of changes made during the intervention, whilst continuing to benefit from professional support.

Bearing in mind that FBBT is a resource intensive programme requiring commitment from both staff and families, in return for significant, though modest weight loss, the cost-effectiveness of this intervention will need to be calculated and evaluated.

Clinicians also need to be aware of the fact that although children in this study showed a significant reduction adiposity at the end of treatment, they continued to be obese. Goal setting may therefore be indicated prior to treatment to help families to set realistic expectations. Furthermore, as children are still likely to be affected by the health risks associated with obesity, clinical management of such issues needs to borne in mind.

A further important factor which needs to be borne in mind is that children attending for treatment live within a culture and society that frequently encourages behaviours which may lead to obesity, also termed the 'obesogenic environment' (Poster & Foreyt, 1999; Swinburn et al, 1999). The behaviours with regards to a healthy diet and reduction of sedentary activities for example, as encouraged by the intervention may therefore be at odds with messages from the environment the child lives in. This may result in conflict for children, particularly where behavioural changes deviating from the 'norms' of the peer group are encouraged. Such tensions will need to be explored within the context of the intervention and addressed to support children in making behavioural changes in the face of conflicting messages and peer pressure. This may for example be done through the use of role-play and activities which improve problem-solving, assertiveness and self-esteem.

4.6 CONCLUSION

The aim of the current study was to assess the feasibility and impact of FBBT for childhood obesity in a clinical setting in the UK. Furthermore, the impact of the intervention on levels of activity, eating behaviour, eating attitudes and parental feeding style were examined alongside psychological variables. Results of the current study suggest that FBBT is effective in achieving significant reduction in adiposity in an obese UK clinical population, with treatment gains being maintained at short-term follow-up. The study further showed that FBBT did not result in increased eating pathology, though families may perceive themselves to be on a 'diet' rather than making permanent life-style changes. Furthermore, improvements with respect to diet, eating behaviour, levels of activity, parental feeding style as well as mood, self-esteem and general difficulties were reported following treatment. Treatment gains were maintained or improved on in all areas, except for consumption of 'red' foods at three-month follow-up. Based on the present study it can be concluded that FBBT was an effective and feasible intervention in a UK, clinical setting, and providing findings can be replicated, is an appropriate treatment of paediatric obesity. The obesogenic environment, as well as the possibility of perceiving the intervention as a diet are areas which will need to be considered in clinical practice. A RCT using a UK clinical sample, including long-term follow-up as well as research aiming to identify individual treatment components related to change would further facilitate understanding of the effectiveness of FBBT.

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Appendix A: Ethical Approval

University College London Hospitals NHS

NHS Trust

The Joint UCL/UCLH Committees on the Ethics of Human Research: Committee A

Co-Chairmen:
Mr M Harrison and Dr R MacAllister

Please address all correspondence to:
Iwona Nowicka
Research & Development Directorate
UCLH NHS Trust
1st floor, Vezey Strong Wing
112 Hampstead Road, LONDON NW1 2LT
Tel. 020 7380 9579 Fax 020 7380 9937
e-mail: iwona.nowicka@uclh.org

Professor J Wardle
Director of the Health Behavioural Unit
UCL
Department of Epidemiology and Public Health
2-16 Torrington Place

01 March 2002

Dear Professor Wardle

Study No: **02/0061** *(Please quote in any correspondence)*
Title: **UK pilot evaluation of a family-based behavioral intervention for paediatric obesity**

Thank you for submitting this research proposal for review by the Ethics Committee. There were no ethical reasons why this study should not proceed. The Committee would appreciate your views on the following minor issues:

1. What will happen to children who are screened but not included in the trial? Will they be offered specialist treatment or referred back to their GP?

2. What provisions will be made for children who are red-green colour blind?

Yours sincerely

pp.
Dr R MacAllister
Chairman

Wardle1mch/rmac/ljn /26/03/02

DEPARTMENT OF PSYCHOLOGICAL MEDICINE
EATING DISORDERS TEAM
TEL NO.: +44 0207 829 8679 Ext 5858
FAX NO.: +44 0207 829 8657

15th February 2002

Professor Mike Preece
Chairman, Ethics Committee
BEM Unit
ICH

Dear Mike

Re: UK evaluation of a family-based behavioural intervention for paediatric obesity

As we discussed, I am enclosing information about the first in a series of studies to look at the treatment of childhood obesity based on the best evidence model so far.

As outlined in the attached outline protocol, phase one is to run initial pilot groups to increase familiarity with the programme, suitability of assessment materials, 'cultural' translation and practicalities of running groups. In the phase two pilot study we aim to randomise families to intervention group or waiting-list control with a cross-over to group intervention at end of control period. The phase 2 effectiveness study will be a prelude to a phase 3 RCT of treatment efficacy on larger scale. It is for phase 1, the pre pilot for which we are seeking Chairman's approval. A full ethics application to Great Ormond Street/ICH and UCL/UCLH will be submitted for the phase 2 pilot study.

The study is being undertaken in collaboration with Professor Jane Wardle and Dr Carolyn Edwards of the Department of Health Psychology at UCL. Great Ormond Street collaborators are myself and Dr Russell Viner, and patients entered into the first 2 phases of the study will be under my or Dr Viner's care. Subjects will be asked for informed consent to enter the treatment groups.

For phase 1 we aim to recruit 7-10 subjects, with at least one parent for each child. The groups will run after school once a week for 8 weeks and then fortnightly for 4 weeks i.e. 12 in total. The groups will be run by staff from the Great Ormond Street Eating Disorders Team and the Department of Health Psychology. The programme utilises behaviour modification principles to increase healthy eating and activity behaviours. The psycho-educational nature of the groups is non-intrusive in style in terms of emotional aspects of functioning. Although some subjects may experience distress as a result of their overweight (most are in the realm of 200% BMI), the group will aim to normalise their experience in this respect as much as possible. At this stage investigations such as blood tests will only be undertaken if part of routine clinical care.

We hope to start the pre-pilot phase at the beginning of February and look forward to hearing from you soon.

Best wishes

Dr Dasha Nicholls
Lead Clinician/Consultant Child Psychiatrist
Eating Disorders Team

Appendix B: Letter to referrers giving details of the study

Dear

As you know, we are seeking referrals for a trial of a family-based behavioural intervention for paediatric obesity, which we are running in collaboration with Great Ormond Street Hospital.

If you have any children who fulfil the following criteria, they could be considered for the trial:

(i) Child aged between 8 and 12 years
(ii) Child's BMI above 91st centile
(iii) At least one parent willing to participate in treatment
(iv) English as a first language (parent and child)

Children who have an identified medical cause for their obesity (i.e. secondary obesity including Prader Willi syndrome; Hypothalamic syndromes; etc.) or who are currently receiving psychological or psychiatric treatment will not be eligible to participate.

The intervention, described by Len Epstein and his colleagues in the US, is the most well-established and effective intervention available for childhood obesity, with benefits being maintained over the long-term. Evidence for the applicability of this intervention model to the UK paediatric population will have very important implications for addressing the ever increasing prevalence of childhood obesity.

The programme is based on learning theory, and utilises behaviour modification principles to increase healthy eating and activity behaviours. Modifications to energy intake are through the implementation of the so-called 'traffic light diet' where foods are grouped into red ('stop and think'), yellow ('approach with caution') and green ('go') foods depending on caloric density.

Participation would involve both the child at least one parent attending weekly sessions for 12 weeks at Great Ormond Street Hospital. Children will attend a group with other children, while their parent(s) would attend a concurrent parent's

group. The groups will run after school and will be of 1½ hours duration. The group facilitators are experienced health professionals.

If you have any families who you think might be suitable, and who agree to be referred, please send their details to:

Dr Dasha Nicholls
Lead Clinician
Feeding & Eating Disorders Service
Dept. of Child & Adolescent Mental Health
Great Ormond Street Hospital
London WC1N 3JH
Tel: 020 7829 8679 Ext. 5858/5891
Fax no 020 7459 8657.

As we are hoping to start the groups very soon, it would be helpful if you could fax a referral to Dr Dasha Nicholls together with a copy to me (Carolyn Edwards) on 020 7813 2848.

Following referral, families will be contacted by one of the research team and will be offered an assessment appointment to ensure suitability for the trial and to administer pre-treatment questionnaires.

I have enclosed some materials and information sheets about the trial, which you may wish to distribute to families.

If you would like any further information, or have any questions please do not hesitate to contact me on the above number or e-mail: c.edwards@public-health.ucl.ac.uk

Many thanks.
Yours sincerely,

Dr Carolyn Edwards
Clinical Psychologist
Research Team:
Professor Jane Wardle, Professor of Clinical Psychology, UCL
Dr Dasha Nicholls, Consultant Psychiatrist, Great Ormond Street Hospital
Dr Russell Viner, Consultant Paediatric Endocrinologist, UCLH and GOS
Dr Carolyn Edwards, Clinical Psychologist, UCL
Sirja Van Zyl, Clinical Psychologist in Training, UCL

Ethical approval obtained from joint UCL/UCLH Committees on the Ethics of Human Research

EVALUATING A FAMILY BASED BEHAVIOUAL INTERVENTION FOR PAEDIATRIC OBESITY

INFORMATION FOR REFERRERS

If you have any children who fulfil the following criteria, they could be considered for the trial:

(i) Child aged between 8 and 12 years
(ii) Child's BMI above 95th centile
(iii) At least one parent willing to participate in treatment
(iv) English as a first language (parent and child)

Children who have an identified medical cause for their obesity (i.e. secondary obesity including Prader Willi syndrome; Hypothalamic syndromes; etc.) or who are currently receiving psychological or psychiatric treatment will not be eligible to participate.

The intervention, described by Len Epstein and his colleagues in the US, is the most well-established and effective intervention available for childhood obesity, with benefits being maintained over the long-term. Evidence for the applicability of this intervention model to the UK paediatric population will have very important implications for addressing the ever increasing prevalence of childhood obesity.

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If you have any families who you think might be suitable, and who agree to be referred, please send their details to:

Dr Dasha Nicholls
Lead Clinician
Feeding & Eating Disorders Service
Dept. of Child & Adolescent Mental Health
Great Ormond Street Hospital
London WC1N 3JH
Tel: 020 7829 8679 Ext. 5858/5891
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If you would like any further information, or have any questions please do not hesitate to contact Dr Carolyn Edwards on 020 7679 6636 or e-mail: c.edwards@public-health.ucl.ac.uk

Research Team:
Professor Jane Wardle, Professor of Clinical Psychology, UCL
Dr Dasha Nicholls, Consultant Psychiatrist, Great Ormond Street Hospital
Dr Russell Viner, Consultant Paediatric Endocrinologist, UCLH and GOS
Dr Carolyn Edwards, Clinical Psychologist, UCL
Sirja Van Zyl, Clinical Psychologist in Training, UCL

Ethical approval obtained from joint UCL/UCLH Committees on the Ethics of Human Research

Appendix C: Participant information sheet

Royal Free and University College Medical School
Department of Epidemiology and Public Health
University College London
Gower Street Campus

HEALTH BEHAVIOUR UNIT
2-16 Torrington Place
London WC1E 6BT

Telephone +44 (0)20 7679 6642
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Director *Professor Jane Wardle*
Assistant Director *Professor Martin Jarvis*

CONFIDENTIAL

INFORMATION SHEET

Evaluating a family-based behavioural treatment for childhood obesity

You are being invited to take part in a research study. Before you decide whether you would like to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read this information sheet carefully and discuss it with others if you wish. If there is anything that is not clear or if you would like more information please do not hesitate to contact Dr Carolyn Edwards on the above telephone number.

The aim of the study

The aim of this study is to investigate a family-based treatment programme for childhood obesity.

Why is the study being done?

There are very few services available for overweight children and their families in this country. We would like to find out if this programme, which has been developed in the United States, is helpful to children and families in the UK.

What will happen if we take part?

If you agree to be referred to this treatment programme, you will be sent an initial appointment to come and meet with us. We will be running two groups between now and the end of the year. After our initial meeting, provided the programme is considered to be suitable for your child, we will be able to let you know when your group will start.

If you do decide to take part, you and your child would attend group sessions once a week for 12 weeks. Your child would be part of a group with other children, while you would meet with other parents. The groups will be run by health professionals who have experience in working with children and families. The programme teaches you and your child how to increase healthy eating and activity behaviours.

The groups will be run, after school, at Great Ormond Street Hospital and each session will last for 1½ hours. Unfortunately we are unable to reimburse you for your travel expenses.

You and your child will be asked to fill in some questionnaires before the first group session and after the final group session. You and your child will also be weighed and measured, both before and after the groups. You will be weighed and measured in private.

What are the potential benefits?
We anticipate that your child will benefit from the treatment programme. We hope that, following the study, a similar programme will be made more widely available on the NHS so that other children too can benefit.

What are the risks and discomfort?
No risk to you or your child can be foreseen.

Do I have to take part in this study?
It is up to you and your child to decide whether or not to take part. If you do decide to take part you will be asked to sign a consent form. If you decide, now or at a later stage, that you do not wish to participate in this research project, that is entirely your right. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

Who will have access to the research records?
All information which is collected about you and your child during the course of this research will be kept strictly confidential.

The use of some types of personal information is safeguarded by the Data Protection Act 1998 (DPA). The DPA places an obligation on those who record or use personal information, but also gives rights to people about whom information is held. If you have any questions about data protection, contact the Data Protection officer via the switchboard.

Who do I speak to if problems arise?
If you have any complaints about the way in which the study has been, or is being conducted, please, in the first instance, discuss them with the group facilitator. If the problems are not resolved, or you wish to comment in any other way, please contact the Chairman of the Research Ethics Committee, Research and Development Office, UCLH NHS Trust, 1st Floor, Vezey Strong Wing, 112 Hampstead Road, London. NW1 2LT.

How to contact the researchers:
Dr. Carolyn Edwards, Health Behaviour Unit, University College London, Gower Street. WC1E 6BT. Tel:020 7679 6642

Should you decide to take part in this research study, you will be given a copy of this information sheet and asked to sign a consent form for your records.

Appendix E: Information pack for parents and children

Date:

Dear

Thank you for your interest in the Traffic Light programme. Please find enclosed some further information about the group. We hope that this will help you decide whether you would like to take part our programme.

If you and your child feel that you would like to be considered for the trial you will need to ask your GP to refer you. We have enclosed some information for you to either send or take along to your GP which will help him or her to decide whether this group would be beneficial for your child. We will need the referral from your GP before you can be considered for the trial.

Once your GP has referred you to the group we will contact you again and make an appointment for you to come and meet us for an assessment. This will give us an opportunity to find out more about you and to answer any questions you may have.

If you have any further questions at this stage, please do not hesitate to contact me on (020) 7679 6632.

Yours sincerely,

Dr Carolyn Edwards
Clinical Psychologist

CONFIDENTIAL

INFORMATION SHEET

Evaluating a family-based behavioural treatment for childhood obesity

You are being invited to take part in a research study. Before you decide whether you would like to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read this information sheet carefully and discuss it with others if you wish. If there is anything that is not clear or if you would like more information please do not hesitate to contact Dr Carolyn Edwards on the above telephone number.

The aim of the study
The aim of this study is to investigate a family-based treatment programme for childhood obesity.

Why is the study being done?
There are very few services available for overweight children and their families in this country. We would like to find out if this programme, which has been developed in the United States, is helpful to children and families in the UK.

What will happen if we take part?
If you agree to be referred to this treatment programme, you will be sent an initial appointment to come and meet with us. We will be running two groups between now and the end of the year. After our initial meeting, provided the programme is considered to be suitable for your child, we will be able to let you know when your group will start.

If you do decide to take part, you and your child would attend group sessions once a week for 12 weeks. Your child would be part of a group with other children, while you would meet with other parents. The groups will be run by health professionals who have experience in working with children and families. The programme teaches you and your child how to increase healthy eating and activity behaviours.

The groups will be run, after school, at Great Ormond Street Hospital and each session will last for 1½ hours. Unfortunately we are unable to reimburse you for your travel expenses.

The Traffic Light Programme

The number of children who weigh too much has increased rapidly over the past few decades. It is estimated that, in the United Kingdom, around 300,000 children under the age of 16 years are obese and risk serious health problems because of excess weight.

Until recently, few parents knew what to do for their overweight or obese children. Diets for children simply were not available. Some parents, afraid that they might stunt their child's growth, were reluctant even to try to help their son or daughter lose weight. Others tried and failed. They found that they could not keep their child from raiding the biscuit tin, munching on crisps, or drinking sugary drinks when these foods were available for other family members.

The Traffic Light programme for Children, designed to change children's eating and exercise behaviour, can change all that. What you will learn from the groups can help you improve your children's lives permanently. They will feel better and be healthier. And so will you.

The Traffic Light programme for Children is a scientifically proven programme based on a decade of research at the Western Psychiatric Institute and Clinic, University of Pittsburgh School of Medicine in the USA. You are being invited to take part in one of the first trials of this programme in the UK.

While the Traffic Light programme is especially designed for children from eight to twelve years old, parents and siblings can reap the rewards too. One mother who participated in the programme was able to break a three-generation chain of obesity in her family.

The Traffic Light programme is not just a diet; it is designed to change your children's eating habits and health behaviour for good. By teaching them about nutrition and exercise, it gives them important new skills that will serve them for the rest of their lives. Because this is a family-based programme, it will help everyone in your family - children, teenagers, and adults, regardless of weight – to maintain a balanced but low fat diet through good food choices and sensible portion sizes.

The Traffic Light programme takes time, dedication, and work. The pounds will not magically "melt away" overnight; instead, your children will lose weight steadily and safely. The programme operates on the belief that a gradual weight loss, one that takes off about 1 pound per week, is by far the best route to permanent success.

Because the diet emphasizes low-fat, but healthy foods - skimmed milk, fruits and vegetables, whole grains, poultry, fish, and lean meats - children find that they can lose weight and not feel hungry. And since there are no "forbidden" foods, they never have to feel deprived.

There is no rigid menu to follow in the Traffic Light programme. This is a programme designed to be tailored to your overweight child's - and your family's - needs and tastes.

You are in control here. The emphasis is on making smart food choices and paying attention to portion sizes.

All food on the Traffic Light programme is divided into three simple, colour-coded categories: red, yellow, and green - just like the signals on a traffic light. Children find this concept appealing and easy to learn. Following the Traffic Light signals makes dieting fun and almost a game for them.

The Traffic Light programme appeals psychologically to children for several reasons. Unlike other programmes, it involves the entire family. All of you will work together to help the overweight children in your household to lose weight. This approach gives them much-needed moral support. The Traffic Light programme also places no blame about who is responsible for a child being overweight. We start with the premise that no one is at fault - neither child nor parent. Rather, it is important simply to move ahead and help your child lose weight.

By attending the group with other children their own age and by reading information, children also learn that they are not alone in their battle against obesity. Your children will learn about other children who face the same challenges and triumphs that they will face during the Traffic Light programme.

People lose weight most successfully when they diet with a partner. Research shows that weight-loss programmes that focus only on one person in a family simply do not work in the long run. If you have ever tried putting your son or daughter on a diet while the rest of the family indulges in such "regular" food as fried chicken, chips, biscuits, ice cream, and cake, you already know what we mean.

The Traffic Light programme works in part because it relies on teamwork. You or your spouse will be your child's diet partner. Your participation and that of your whole family is important for your child's success. Even if you do not need to lose weight yourself, you can still reap the rewards of better nutrition: More fruits and vegetables. More complex carbohydrates. Less fat. Plus, you will learn about exercise and how to fit it into a busy schedule. Working with other parents who have experienced similar difficulties to yourself will help you feel supported.

How the Traffic Light programme can help

The good news is that the Traffic Light programme successfully helps children lose weight because it starts with parents. You will teach your children not only new ways of eating, but also new activities that will help them lose those added pounds. With your help and support, they will discover that losing weight, or stopping gaining more weight, is within their grasp.

The children who have already benefited from the Traffic Light programme see differences in their abilities. Without those extra pounds they find new energy and their physical fitness increases. "I can run faster," says Anna's older sister, Louise. "Now I can beat some people that I couldn't beat before." Other children on the Traffic Light programme have taken up gymnastics, ballet, and karate. Many children show more confidence and greater self-esteem.

What will happen if we decide to take part?

You would attend 12 weekly sessions with your child. In the sessions yc about nutrition, about how to support behavioural change in your children how to record what you eat, and the amount you exercise. You will learn a goals for your children and yourself.

The lessons you learn here are geared toward maintaining weight loss not ju weeks, or a few months, but for the many years your children have ahead. I regardless of when your family chooses to diet. There are birthday c anniversaries, holidays, and family reunions. Can you imagine never eatin again? Or cake? Or a chocolate bar? Few children or adults could adhere programme like that.

The philosophy behind the Traffic Light programme is that you do not have t children to make huge sacrifices to manage their weight. Diet martyrs rai their goals and you will learn how everyone can have his cake and eat it t also will not fool you: neither your children nor you can eat these foods lim still lose weight. Your goal is to control the food you consume and stop lett control you and your children.

INFORMATION SHEET

Welcome! We wanted to tell you a little bit more about the programme that your mum or dad have talked to you about. This information sheet will tell you what will happen if you decide to take part in our group. So read on!

Why are we setting up a group?

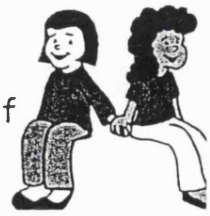
Some children tell us that they have a difficult time with their weight. We are setting up some groups to help children (and their parents) learn some things that will help them to manage their weight. We already know some children who want to come to our group and hope that you might want to come too.

What will happen if I decide to join the group?

If you decide you would like to join us, you would come to see us and the group every week after school for 12 weeks. Your parents will do the same but they will be in a different group with the other parents.

Our group has two group leaders. They will talk about lots of things to do with food and exercise and give you different activities to do in the group and at home.

Why should I do this?



You are going to learn lots of new things about food and exercise! And you will meet lots of new friends! We play lots of games and quizzes too.

Do I have to do this?

We think you will enjoy coming to the group. But you need to decide and you don't have to come if you don't want to. If you want to ask us more questions before you decide, that's okay too! Ask your mum or dad to call us.

What happens next?

If you would like to join our group, we will ask you to come and meet us. When you come, we will ask you to fill in some questionnaires about yourself. After the last group we will ask you to do another questionnaire.

What Is the Traffic Light Programme All About?

Have you ever been teased about your weight? We know many children who have been teased a lot and called names. They didn't like it very much. In fact, it made them feel hurt and angry. These children told us that they often wished they were not overweight. But they said they did not know how to lose weight.

We are going to tell you about a programme that shows you and your family how to lose weight. We will tell you about the Traffic Light programme.

When someone loses weight by cutting back on what they usually eat, it's known as "going on a diet." Maybe you've tried to diet yourself. The children we talked to found that dieting was not their favourite thing to do. If you have ever tried to diet before, perhaps you've found that it wasn't much fun. We have a friend named Josh who felt the same way. Josh is ten years old, and he's been trying to lose weight since he was eight. Josh is the youngest in his family. He has one brother, whose name is Tim. Tim is fifteen years old and he can be a big tease.

When Josh went on a diet, he tried very hard not to eat fattening foods. He said "No thank you" to chips. He turned down ice cream. He drank only one Coke instead of three or four. He even tried to give up eating chocolate chip biscuits - his favourite food.

For a day or so, Josh did really well. But then he would see Tim dipping into the ice cream. Or he'd watch Tim pour himself another coke. The real tough part came when Tim would eat a whole packet of Josh's favourite chocolate-chip biscuits. When that happened, Josh found he just couldn't stick to the diet anymore. It was too hard watching Tim and the rest of his family eat all the foods that Josh wanted to eat too.

So Josh stopped his diet and gained weight again. Sometimes Josh had trouble running as fast as his friends. Then his team-mates in

football began making fun of him during games because he couldr run as fast as they did. Josh quit the team at the end of the seaso One day, Josh took a long look at himself in the mirror and w surprised by what he saw. He looked fat. His belly stuck out an his legs looked as if they were twice as big as his older brother' Josh never told anyone about how bad he felt. He was s embarrassed about his fat legs that he would not wear shorts in th summer even when it was really, really hot.

Josh might have refused to wear shorts for the rest of his life, exce that something wonderful and unexpected happened one day. H and his parents were watching television when an advert flashed o the screen. It said, "Wanted. families with overweight children for new programme."

Josh's mother said to his father. "Listen to this advert. Maybe w ought to call and find out about it." Josh's father grabbed a penc and wrote down the telephone number that appeared on th television screen. His mother called the next day, and a week aft that, Josh and his parents were on their way to starting the Traffi Light programme with a group of other children and their families.

Josh was a little worried. He wondered what it would be like. H was surprised to find that he met a lot of nice people, who weighe him and measured how tall he was. They also determined how muc fat Josh had on his body. It was all very painless.

Josh and his parents waited a little while. Then they went into a office where a woman told them that they could join the Traffi Light programme. She explained that Josh and his family shoul come back next week for another visit. She told Josh that he woul meet other children who would also be starting the Traffic Ligl programme. She said that the programme would help him los weight. Josh liked hearing that, but wondered if this diet woul really work.

Then the woman told him the best news. She said that everyone i his family - his mother, his father, even Tim would be starting th Traffic Light programme too. "Even Tim!" Josh exclaimed. "I thin I'm going to like this programme."

And he did. Over the next several months, Josh worked very
and learned a lot. He learned about eating foods that are goo
him. He learned about exercise. But most of all, Josh learned
to lose weight.

When he lost some weight, Josh found he could run a lot faster
even started taking karate lessons. Other people stopped teasing
about his weight. He still grew out of his clothes - not because
became too tight, but because they became too loose! Josh cha
a lot. He's very proud of what he's done.

You can do what Josh did. If you decide to come to the groups
your mum and dad, you will learn everything that Josh anc
parents learned. One of the things we will teach you is how to
weight, and keep it off forever.

Why do we call our programme the Traffic Light programme?
named after the signals on a Traffic Light. Most Traffic Lights
three signals. You know that the green signal means "Go."
yellow signal tells you "Caution" or "Be careful," because the lig
about to change. The red signal, of course, means "Stop!"

We have placed all the food that you eat into three different gr
These are called *red foods, yellow foods, and green foods.*
thinking about the three different signals on a Traffic Light e
time you eat, you can make good decisions about which foods to

But you should also know that a food's real colour does not al
match its food group colour. For instance, when Josh first st
the Traffic Light diet, he thought that a red apple would be a
food. But he learned that all apples are in the group of green f
since they are not very fattening and are very good for you
sometimes call foods that are good for you nutritious foods).

You will soon find that the real colour of most foods is not impo
on the Traffic Light diet. What matters is the colour of the
group. Like Josh, you will learn which foods belong to which c
groups.

Red foods on the Traffic Light programme are very fatter means that they make people gain weight. When you thinl a red food, remember the red light on a traffic signal and *st*

Yellow foods are less fattening than red foods. In fact, n that we eat fall into the yellow food group. What does signal tell you? "Caution," or "Be careful" - and that is need to do when you eat yellow foods.

Green foods on the Traffic Light programme are not fatter the green signal on a Traffic Light, these foods mean "Go. to eat green foods, almost as many as you want.

Josh and his family aren't the only ones who went on t Light programme. We know children from lots more fan have already lost weight on the Traffic Light programme. Traffic Light programme will help you lose weight too! Bı part of the Traffic Light programme is this: It will teach y change your life forever. If you decide you would like t programme, we will show you how to lose weight and how to keep it off for good.

date

Dear GP
Re:

We understand that the above family are interested in participating in a trial of a family-based behavioural intervention for paediatric obesity, which we are running in collaboration with Great Ormond Street Hospital.

Please find enclosed further information about the trial. In order for us to consider the family's suitability for the trial, we would need a referral from you to Dr Dasha Nicholls at Great Ormond Street Hospital.

Children who would like to be considered for the trial need to meet the following criteria:

(i) Child aged between 8 and 11 years
(ii) Child's BMI above 95th centile
(iii) At least one parent willing to participate in treatment
(iv) English as a first language (parent and child)

Children who have an identified medical cause for their obesity (i.e. secondary obesity including Prader Willi syndrome; Hypothalamic syndromes; etc.) or who are currently receiving psychological or psychiatric treatment will not be eligible to participate.

The intervention, described by Len Epstein and his colleagues in the US, is the most well-established and effective intervention available for childhood obesity, with benefits being maintained over the long-term. Evidence for the applicability of this intervention model to the UK paediatric population will have very important implications for addressing the ever increasing prevalence of childhood obesity.

The programme is based on learning theory, and utilises behaviour modification principles to increase healthy eating and activity behaviours. Modifications to energy intake are through the implementation of the so-called 'traffic light diet'

where foods are grouped into red ('stop and think'), yellow ('approach with caution') and green ('go') foods depending on caloric density.

Participation would involve both the child and at least one parent attending weekly sessions for 12 weeks at Great Ormond Street Hospital. Children will attend a group with other children, while their parent(s) would attend a concurrent parent's group. The groups will run after school and will be of 1½ hours duration. The group facilitators are experienced health professionals.

Should you feel this family might be suitable, and agree to their referral, please complete and return the attached referral form as soon as possible. As we are hoping to start the groups very soon, it would be helpful if you could fax the referral to:

Dr Dasha Nicholls.
Lead Clinician
Feeding & Eating Disorders Service
Dept. of Child & Adolescent Mental Health
Great Ormond Street Hospital
London WC1N 3JH
Tel: 020 7829 8679 Ext. 5858/5891
Fax no 020 7459 8657.

Following referral, families will be contacted again by one of the research team and will be offered an assessment appointment to ensure suitability for the trial and to administer pre-treatment questionnaires.

If you would like any further information, or have any questions please do not hesitate to contact me on the above number or e-mail: c.edwards@public-health.ucl.ac.uk

Many thanks.
Yours sincerely,

Dr Carolyn Edwards
Clinical Psychologist
Research Team:
Professor Jane Wardle, Professor of Clinical Psychology, UCL
Dr Dasha Nicholls, Consultant Psychiatrist, Great Ormond Street Hospital
Dr Russell Viner, Consultant Paediatric Endocrinologist, UCLH and GOS
Dr Carolyn Edwards, Clinical Psychologist, UCL
Sirja Van Zyl, Clinical Psychologist in Training, UCL

Ethical approval obtained from joint UCL/UCLH Committees on the Ethics of Human Research

Appendix F: Appointment letter for assessment

Address
Xxxxxxxx
Xxxxxxxx

Date

Dear parents of Xxxxxxx

Further to our telephone conversation, I am writing to confirm your assessment appointment with myself on:

Date at *time* pm
at Great Ormond Street Hospital.

Please book in at reception when you arrive and you will be directed to the **Department of Psychological Medicine**, which is on level 4 of the Frontage Building. Please find a map enclosed.

The purpose of this assessment is for you to find out more information about the groups before you decide if you would like to take part and also for us to check that we think the programme will be suitable for you and your child.

After this assessment, should you continue to feel that the programme is something you would like to participate in and we agree that it will be helpful to you, you will be offered another appointment with Dr. Russell Viner (Consultant Paediatrician) who will ensure that the necessary medical checks have been made.

After these appointments, we will then be able to tell you when the groups will start.

We very much look forward to meeting you and your child on *xx xx xx*. If you have any questions in the meantime, please do not hesitate to contact me on 020 7679 6643.

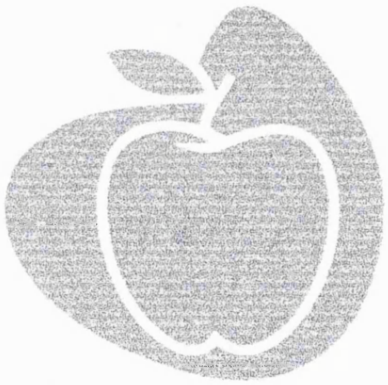
Yours sincerely,

Sirja van Zyl
Trainee Clinical Psychologist

Appendix G: Psychological Assessment (Questionnaires)

Your name:_____

PARENTS' QUESTIONNAIRE



This questionnaire collects information about your family. Please read and answer every question in this booklet. All information provided will be treated in strict confidence and will not be made available to any other source.

Section 1

Information about your child

Child Eating Behaviour Questionnaire

	Never	Rarely	Some Times	Often	Always
1. My child loves food	☐	☐	☐	☐	☐
2. My child eats more when worried	☐	☐	☐	☐	☐
3. My child has a big appetite	☐	☐	☐	☐	☐
4. My child finishes his/her meal very quickly	☐	☐	☐	☐	☐
5. My child is interested in food	☐	☐	☐	☐	☐
6. My child is always asking for a drink	☐	☐	☐	☐	☐
7. My child refuses new foods at first	☐	☐	☐	☐	☐
8. My child eats slowly	☐	☐	☐	☐	☐
9. My child eats less when angry	☐	☐	☐	☐	☐
10. My child enjoys tasting new foods	☐	☐	☐	☐	☐
11. My child eats less when s/he is tired	☐	☐	☐	☐	☐
12. My child is always asking for food	☐	☐	☐	☐	☐
13. My child eats more when annoyed	☐	☐	☐	☐	☐
14. If allowed to, my child would eat too much	☐	☐	☐	☐	☐
15. My child eats more when anxious	☐	☐	☐	☐	☐
16. My child enjoys a wide variety of foods	☐	☐	☐	☐	☐

17. My child leaves food on his/her plate at the end of a meal	☐	☐	☐	☐	☐
18. My child takes more than 30 minutes to finish a meal	☐	☐	☐	☐	☐
19. Given the choice, my child would eat most of the time	☐	☐	☐	☐	☐
20. My child looks forward to mealtimes	☐	☐	☐	☐	☐
21. My child gets full before his/her meal is finished	☐	☐	☐	☐	☐
22. My child enjoys eating	☐	☐	☐	☐	☐
23. My child eats more when s/he is happy	☐	☐	☐	☐	☐
24. My child is difficult to please with meals	☐	☐	☐	☐	☐
25. My child eats less when upset	☐	☐	☐	☐	☐
26. My child gets full up easily	☐	☐	☐	☐	☐
27. My child eats more when s/he has nothing else to do	☐	☐	☐	☐	☐
28. Even if my child is full up s/he finds room to eat his/her favourite food	☐	☐	☐	☐	☐
29. If given the chance, my child would drink continuously throughout the day	☐	☐	☐	☐	☐
30. My child cannot eat a meal if s/he has had a snack just before	☐	☐	☐	☐	☐
31. If given the chance, my child would always be having a drink	☐	☐	☐	☐	☐
32. My child is interested in tasting food s/he hasn't tasted before	☐	☐	☐	☐	☐

	Never	Rarely	Some Times	Often	Always
33. My child decides that s/he doesn't like a food, even without tasting it	☐	☐	☐	☐	☐
34. If given the chance, my child would always have food in his/her mouth	☐	☐	☐	☐	☐

Section 2

These questions are to help us find out about the different types of food your child eats.

Please place a tick in the box which best describes HOW OFTEN Your child eats each of the following food.

For example: if your child usually eats yoghurt two days a week you would tick 2 to show 2 days of the week as below. If s/he has yoghurt less often, only every couple of weeks, you would tick once per fortnight.

	Never	Once per Month	Once per fortnight	Number of days 1 2 3 4 5 6 7
YOGHURT	☐	☐	☐	☐ ☐ ☐ ☐ ☐ ☐ ☐

PLEASE INCLUDE SCHOOL LUNCHES IN YOUR ANSWERS

				Number of days per week
Beefburger and other Beef:(roast beef, stew, etc.)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 2 3 4 5 6 7 ☐ ☐ ☐ ☐ ☐ ☐ ☐
Lamb (chops, roast, stew, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 2 3 4 5 6 7 ☐ ☐ ☐ ☐ ☐ ☐ ☐
Bacon, Ham & Other Pork (Chops, roast, gammon, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 2 3 4 5 6 7 ☐ ☐ ☐ ☐ ☐ ☐ ☐
Sausages (beef or pork, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 2 3 4 5 6 7 ☐ ☐ ☐ ☐ ☐ ☐ ☐
Processed Meats (luncheon meat, chicken loaf, corned beef, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 2 3 4 5 6 7 ☐ ☐ ☐ ☐ ☐ ☐ ☐

Chicken (including turkey, duck, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Liver or Kidney	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Fish Fingers, Fish Cakes or Fish in Batter or Crumb	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Fish not in batter or crumb: plaice, haddock, cod, whiting, tuna in brine etc	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Oily Fish: trout, mackerel, herring, salmon, sardines, pilchards, tuna in oil	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Cottage Cheese	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Cheddar or other Cheese	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Skimmed or Semi Skimmed Milk	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Other Milk (whole milk, silver top etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Yoghurt	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Eggs	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Breakfast Cereals – Low Fibre (Cornflakes, Porridge, Frosties, Cocopops, Sugar Puffs, Ricicles, Rice Krispies)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Breakfast Cereals – High Fibre (Bran Flakes, Weetabix, Shredded Wheat, Puffed Wheat, All Bran, Muesli, Fruit 'n' Wheat, Grapenuts, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Pasta	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Rice	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Sweet Biscuits (including Chocolate covered)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Cakes, Scones etc	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Sweets, Chocolate Bars, etc	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Crisps (and other packet snacks)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
White Bread (including Pitta, Chappati, Nan, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Brown Bread (granary, wholemeal, wholewheat, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Baked Beans, Lentils, Chick Peas, Dahl, Kidney Beans, Soya Mince	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Chips, Fried or Roast Potatoes	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Other Potatoes (boiled, mashed etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Yams, Sweet Potatoes, Plantain	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Green Cooked Vegetables (including cauliflower, peas, broccoli, aubergines, green beans, brussell sprouts, cabbage, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Other Cooked Vegetables	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Salads (including raw vegetables)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Fruit (fresh or tinned)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Soft Drinks (Coke, Fanta, Seven-up, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Low Calorie Soft Drinks (Diet Coke, Diet Pepsi, etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Fruit Juice, Squash, Ribena, etc	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Unsweetened Fruit Juices	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Please place a tick in the box that best describes how often you use EACH TYPE OF FAT OR OIL IN PREPARATION OF YOUR CHILD'S FOOD (IN COOKING, ON BREAD FOR SANDWICHES ETC)

Lard/ Dripping	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Olive Oil	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Vegetable Oil (e.g. corn oil, Sunflower oil etc)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Butter	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Margarine (except low fat)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Low Fat Margarine	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
Ghee (clarified Butter)	Never ☐	Once per Month ☐	Once per fortnight ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Section 3

Please read the following statements and tick one of the boxes to show how you deal with feeding your child. It is important to remember that there are no right or wrong answers to these questions and all we want is some information on what parents really feel and do.

	I never do	I rarely do	I some-times do	I often do	I always do
I allow my child to decide which foods to have for meals	☐	☐	☐	☐	☐
I decide how many snacks my child should have	☐	☐	☐	☐	☐
I use puddings as a bribe to get my child to eat his/ her main course	☐	☐	☐	☐	☐
I encourage my child to look forward to the meal	☐	☐	☐	☐	☐
I decide what types of food my child has at mealtimes	☐	☐	☐	☐	☐
I encourage my child to try foods that s/he hasn't tasted before	☐	☐	☐	☐	☐
I let my child decide when s/he would like to have his/her meal	☐	☐	☐	☐	☐
I give my child something to eat when s/he is feeling bored	☐	☐	☐	☐	☐
I let my child eat between meals whenever S/he wants	☐	☐	☐	☐	☐
I praise my child when s/he eats what I give her/him	☐	☐	☐	☐	☐
I decide what type of food my child eats between meals	☐	☐	☐	☐	☐
I present food in an attractive way to my child	☐	☐	☐	☐	☐

	I never do	I rarely do	I some-times do	I often do	I always do
I allow my child to eat as much as s/he likes at snacktime	❑	❑	❑	❑	❑
I decide the time when my child eats his/ her meals	❑	❑	❑	❑	❑
If my child misbehaves I withhold his/her Favourite food	❑	❑	❑	❑	❑
I give my child something to eat to make him/her feel better when s/he has been hurt	❑	❑	❑	❑	❑
I insist that my child eats meals at the table	❑	❑	❑	❑	❑
I encourage my child to enjoy his/her food	❑	❑	❑	❑	❑
I reward my child with something to eat when s/he is well behaved	❑	❑	❑	❑	❑
I encourage my child to eat a wide variety of foods	❑	❑	❑	❑	❑
I praise my child if s/he tries a new food	❑	❑	❑	❑	❑
I decide when it is time for my child to have a snack	❑	❑	❑	❑	❑
In order to get my child to behave him/herself I promise him/her something to eat	❑	❑	❑	❑	❑
I give my child something to eat to make him/her feel better when s/he is feeling angry	❑	❑	❑	❑	❑
I give my child something to eat to make him/her feel better when s/he is feeling worried	❑	❑	❑	❑	❑
I give my child something to eat to make him/her feel better when s/he is feeling upset	❑	❑	❑	❑	❑
I encourage my child to taste each of the foods I serve at meals	❑	❑	❑	❑	❑

Section 4

Please read the following statement and place a tick in the box that you think best applies to your child.

Television viewing and reading

- Does your child have a television in his/her room? Yes ☐ No ☐

- How many television sets do you have in your house?

☐ one ☐ two ☐ three ☐ four ☐ five or more

- In total how many hours does your child usually spend playing on the computer from Monday to Friday (*please state total number of hours for 5 days*)?

☐ less than 1 hour ☐ 1-3 hours ☐ 4-6 hours ☐ 7-9 hours ☐ 10–12 hours ☐ 13-15 hours ☐ none

- In total how many hours of television does your child usually watch (include videos watched as well television viewing) from Monday to Friday (*please state total number of hours for 5 days*)?

☐ less than 1 hour ☐ 1-3 hours ☐ 4-6 hours ☐ 7-9 hours ☐ 10–12 hours ☐ 13-15 hours ☐ none

- During an average weekend, how many hours of television does your child usually watch <u>in total</u> (include videos watched as well television viewing)?

☐ less than 1 hour ☐ 1-3 hours ☐ 4-6 hours ☐ 7-9 hours ☐ 10–12 hours ☐ 13-15 hours ☐ none

- During an average weekend how many hours does your child usually spend <u>in total</u> playing on the computer?

☐ less than 1 hour ☐ 1-3 hours ☐ 4-6 hours ☐ 7-9 hours ☐ 10–12 hours ☐ 13-15 hours ☐ none

Frequency of Exercise

- How often does your child play sports or games (involving getting out of breath or making him/her sweat)...

❒	❒	❒	❒	❒	❒	❒	❒
more than once a day	6-7 times per week	4-5 times per week	2-3 times per week	once a week	three times a month	twice a a month	once a a month

- Compared to other children the same age, how physically active is your child?

❒	❒	❒	❒	❒
much less active	somewhat less active	about average	somewhat more active	much more active

Section 5

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain or the item seems 'daft' Please give your answers on the basis of the child's behaviour over the last six months.

	Not True	Somewhat True	Certainly True
Considerate of other peoples feelings	❒	❒	❒
Restless, overactive, cannot stay still for long	❒	❒	❒
Often complains of headaches, stomach-aches or sickness	❒	❒	❒
Shares readily with other children (treats, toys, pencils etc.)	❒	❒	❒
Often has temper tantrums or hot tempers	❒	❒	❒
Rather solitary, tends to play alone	❒	❒	❒
Generally obedient, usually does what adults request	❒	❒	❒

	Not True	Somewhat True	Certainly True
Many worries, often seems worried	❐	❐	❐
Helpful if someone is hurt, upset or feeling ill	❐	❐	❐
Constantly fidgeting or squirming	❐	❐	❐
Has at least one good friend	❐	❐	❐
Often fights with other children or bullies them	❐	❐	❐
Often unhappy, down-hearted or tearful	❐	❐	❐
Generally liked by other children	❐	❐	❐
Easily distracted, concentration wanders	❐	❐	❐
Nervous or clingy in new situations, easily loses confidence	❐	❐	❐
Kind to younger children	❐	❐	❐
Often lies or cheats	❐	❐	❐
Picked on or bullied by other children	❐	❐	❐
Often volunteers to help others (parents, teachers, other children)	❐	❐	❐
Thinks things out before acting	❐	❐	❐
Steals from home, school or elsewhere	❐	❐	❐
Gets on better with adults than with other children	❐	❐	❐
Many fears, easily scared	❐	❐	❐
Sees tasks through to the end, good attention span	❐	❐	❐

Do you have any other comments or concerns?

Overall, do you think that your child has difficulties in one or more of the following areas: emotions, concentration, behaviour or being able to got on with other People?

No	Yes- minor difficulties	Yes – definite difficulties	Yes – severe difficulties
☐	☐	☐	☐

If you have answered "Yes", please answer the following questions about these difficulties:

- How long have these difficulties been present?

Less than a month	1-5 months	6-12 months	Over a year
☐	☐	☐	☐

- Do the difficulties upset or distress your child?

Not at all	Only a little	Quite a lot	A great deal
☐	☐	☐	☐

- Do the difficulties interfere with your child's everyday life in the following areas?

	Not at all	Only a little	Quite a lot	A great deal
Home Life	☐	☐	☐	☐
Friendships	☐	☐	☐	☐
Classroom Learning	☐	☐	☐	☐
Leisure Activities	☐	☐	☐	☐

Do the difficulties put a burden on you or the family as a whole?

Not at all	Only a little	Quite a lot	A great deal
☐	☐	☐	☐

Section 6

The following statements ask about <u>your own</u> eating behaviour. Please circle the number which applies best to each statement. Please answer all questions.

	Always	Very Often	Often	Sometimes	Rarely	Never
1. I am terrified about being overweight.	1	2	3	4	5	6
2. I have gone on eating binges where I feel that I may not be able to stop.	1	2	3	4	5	6
3. I avoid eating when I am hungry.	1	2	3	4	5	6
4. I find myself preoccupied with food.	1	2	3	4	5	6
5. I cut my food into small pieces.	1	2	3	4	5	6
6. I feel that others would prefer if I ate more.	1	2	3	4	5	6
7. I am aware of the calorie content of foods that I eat.	1	2	3	4	5	6
8. I vomit after I have eaten.	1	2	3	4	5	6
9. I particularly avoid foods with a high carbohydrate content (eg. bread, potatoes, rice etc.)	1	2	3	4	5	6
10. I think about burning up calories when I exercise.	1	2	3	4	5	6
11. I am preoccupied with a desire to be thinner.	1	2	3	4	5	6
12. I feel extremely guilty after eating.	1	2	3	4	5	6
13. Other people think that I am too thin	1	2	3	4	5	6
14. I take longer than others to eat my meals.	1	2	3	4	5	6
15. I avoid foods with sugar in them	1	2	3	4	5	6
16. I eat diet foods.	1	2	3	4	5	6
17. I feel that food controls my life.	1	2	3	4	5	6
18. I display self-control around food	1	2	3	4	5	6
19. I feel that others pressure me to eat.	1	2	3	4	5	6

	Always	Very Often	Often	Sometimes	Rarely	Never
20. I give too much time and thought to food.	1	2	3	4	5	6
21. I feel uncomfortable after eating sweets.	1	2	3	4	5	6
22. I engage in dieting behaviour.	1	2	3	4	5	6
23. I like my stomach to be empty.	1	2	3	4	5	6
24. I enjoy trying new rich foods.	1	2	3	4	5	6
25. I am preoccupied with the thought of having fat on my body.	1	2	3	4	5	6
26. I have the impulse to vomit after meals	1	2	3	4	5	6

Please tell us about any diets you are currently following or have followed in the past:

Section 7

At one time or another, all children misbehave or do things that could be harmful, that are "wrong", or that parents don't like. Examples include: hitting someone, whining, throwing food, forgetting homework, not picking up toys, lying, having a tantrum, refusing to go to bed, wanting a biscuit before dinner, running into the street, arguing back, coming home late.

Parents have many different ways or styles of dealing with these types of problems. Below are items that describe some styles of parenting. For each item, circle the number that best describes your style of parenting during the past 2 months with your child.

Sample Item

At meal time...

I let my child decide how much to eat. 1 (2) 3 4 5 6 7 I decide how much my child eats.

When my child misbehaves...

I do something right away. 1 2 3 4 5 6 7 I do something about it later.

Before I do something about a problem...

I give my child several reminders or warnings.	1 2 3 4 5 6 7	I use only one reminder or warning.

When I'm upset or under stress...

I am picky and on my child's back.	1 2 3 4 5 6 7	I am no more picky than usual.

When I tell my child not to do something..

I say very little.	1 2 3 4 5 6 7	I say a lot.

When my child pesters me...

I can ignore the pestering.	1 2 3 4 5 6 7	I can't ignore the pestering.

When my child misbehaves...

I usually get into a long argument with my child.	1 2 3 4 5 6 7	I don't get into an argument.

I threaten to do things that...

I am sure I can carry out.	1 2 3 4 5 6 7	I know 1 won't actually do.

I am the kind of parent that..

Sets limits on what my child is allowed to do.	1 2 3 4 5 6 7	lets my child do whatever he or she wants.

When my child misbehaves..

I give my child a long lecture.	1 2 3 4 5 6 7	I keep my talks short And to the point.

When my child misbehaves...

I raise my voice or yell.	1 2 3 4 5 6 7	I speak to my child calmly.

If saying no doesn't work right away..

I take some other kind of action.	1 2 3 4 5 6 7	I keep talking and trying to get through to my child.

When I want my child to stop doing something...

I firmly tell my child to stop.	1 2 3 4 5 6 7	I coax or beg my child to stop

When my child is out of my sight...

I often don't know what my child is doing. 1 2 3 4 5 6 7 I always have a good idea of what my chil Is doing

After there's been a problem with my child...

I often hold a grudge. 1 2 3 4 5 6 7 things get back to normal quickly

When we're not at home...

I handle my child the way I do at home. 1 2 3 4 5 6 7 I let my child get a with a lot more.

When my child does something I don't like...

I do something about it every time it happens. 1 2 3 4 5 6 7 I often let it go.

When there's a problem with my child...

things build up and I do things I don't mean to do. 1 2 3 4 5 6 7 things don't get out hand.

When my child misbehaves, I spank, slap, grab, or hit my child...

never or rarely. 1 2 3 4 5 6 7 most of the time.

When my child doesn't do what I ask...

I often let it go or end up doing It myself. 1 2 3 4 5 6 7 I take some other action.

When I give a fair threat or warning..

I often don't carry It out. 1 2 3 4 5 6 7 I always do what I

If saying "No" doesn't work...

I take some other kind of action 1 2 3 4 5 6 7 I offer my child so so he/she will beha

When my child misbehaves...

I handle it without getting upset. 1 2 3 4 5 6 7 I get so frustrated or angry that my child can see I'm upset

When my child misbehaves...

I make my child tell me why he/she did it. 1 2 3 4 5 6 7 I say "No" or take some other action.

If my child misbehaves and then acts sorry...

I handle the problem like I usually would. 1 2 3 4 5 6 7 I let it go that time

When my child misbehaves...

I rarely use bad language or curse. 1 2 3 4 5 6 7 I almost always use bad language.

When I say my child can't do something...

I let my child do it anyway. 1 2 3 4 5 6 7 I stick to what I said.

When I have to handle a problem...

I tell my child I am sorry about it. 1 2 3 4 5 6 7 I don't say I'm sorry

When my child does something I don't like, I insult my child, say mean things or call my child names...

Never or rarely 1 2 3 4 5 6 7 Most of the time

If my child talks back or complains when I handle a problem...

I ignore the complaining and stick to what I said 1 2 3 4 5 6 7 I give my child a talk about not complaining

If my child gets upset when I say "No"...

I back down and give in to my child. 1 2 3 4 5 6 7 I stick to what I said

Section 8

1. Please tell us what you would like to get out of coming to the group:

Thank you for completing the questionnaire. If you have any further comments please use the space overleaf.

Your name:_____

Childrens' QUESTIONNAIRE

Your name:_____ Date: _____

This questionnaire collects information about you and your family. Please read and answer every question in this booklet. All information provided will be treated in strict confidence and will not be shared with your teacher, your parents or anyone else.

Section 1

Here are a set of statements. Some of them are true of you and so you will circle the yes. Some are not true of you and so you will circle the no. Answer every question even if some are hard to decide, but do not circle both yes and no. Remember, circle the yes if the statement is generally like you, or circle the no if the statement is generally not like you. There are no right or wrong answers. Only you can tell us how you feel about yourself, so we hope you will mark the way you really feel inside.

1. My classmates make fun of me	yes	no
2. I am a happy person	yes	no
3. It is hard for me to make friends	yes	no
4. I am often sad	yes	no
5. I am smart	yes	no
6. I am shy	yes	no
7. I get nervous when the teacher calls on me	yes	no
8. My looks bother me	yes	no
9. When I grow up, I will be an important person	yes	no
10. I get worried when we have tests in school	yes	no
11.I am unpopular	yes	no
12. I am well behaved in school	yes	no
13. It is usually my fault when something goes wrong	yes	no
14. I cause trouble to my family	yes	no
15. I am strong	yes	no
16.I have good ideas	yes	no
17. I am an important member of my family	yes	no
18. I usually want my own way	yes	no
19. I am good at making things with my hands	yes	no
20. I give up easily	yes	no
21. I am good in my school work	yes	no
22. I do many bad things	yes	no
23. I can draw well	yes	no
24. I am good in music	yes	no
25. I behave badly at home	yes	no
26. I am slow in finishing my school work	yes	no
27 I am an important member of my class	yes	no
28. I am nervous	yes	no
29. I have pretty eyes	yes	no
30. I can give a good report in front of the class .	yes	no
31. In school I am a dreamer	yes	no
32. I pick on my brother(s) and sister(s)	yes	no
33. My friends like my ideas	yes	no
34. I often get into trouble	yes	no

35. I am obedient at home yes no
36. I am lucky yes no
37. I worry a lot yes no
38. My parents expect too much of me yes no
39. I like being the way I am yes no
40. I feel left out of things yes no
41. I have nice hair yes no
42. I often volunteer in school yes no
43. I wish I were different yes no
44. I sleep well at night yes no
45. I hate school yes no
46. I am among the last to be chosen for games yes no
47. I am sick a lot yes no
48. I am often mean to other people yes no
49. My classmates in school think I have good ideas yes no
50. I am unhappy yes no
51. I have many friends yes no
52. I am cheerful yes no
53. I am dumb about most things yes no
54. I am good looking yes no
55. I have lots of energy yes no
56. I get into a lot of fights yes no
57. I am popular with boys yes no
58. People pick on me yes no
59. My family is disappointed in me yes no
60. I have a pleasant face yes no
61. When I try to make something, everything seems to go wrong. yes no
62. I am picked on at home yes no
63. I am a leader in games and sports yes no
64. I am clumsy yes no
65. In games and sports, I watch instead of play yes no
66. I forget what I learn yes no
67. I am easy to get along with yes no
68. I lose my temper easily yes no
69. I am popular with girls yes no
70. I am a good reader yes no
71. I would rather work alone than with a group yes no
72. I like my brother (sister) yes no
73. I have a good figure yes no
74. I am often afraid yes no
75. I am always dropping or breaking things yes no
76. I can be trusted yes no
77. I am different from other people yes no
78. I think bad thoughts yes no
79. I cry easily yes no
80. I am a good person yes no

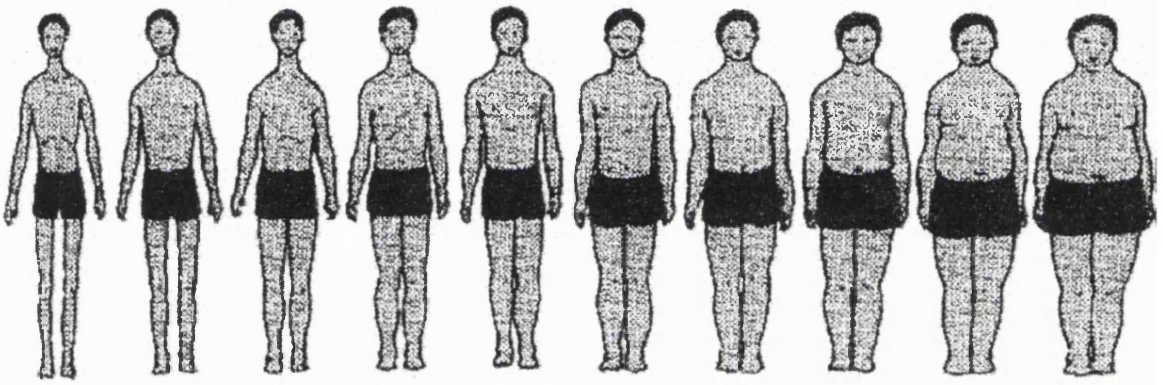
Section 2

Please place a ✓ under the word which best applies to the statements below.

	Always	Very Often	Often	Some-times	Rarely	Never
1. I am scared about being overweight.	❑	❑	❑	❑	❑	❑
2. I stay away from eating when I am hungry.	❑	❑	❑	❑	❑	❑
3. I think about food a lot of the time.	❑	❑	❑	❑	❑	❑
4. I have gone on eating binges where I feel that I might not be able to stop	❑	❑	❑	❑	❑	❑
5. I cut my food into small pieces.	❑	❑	❑	❑	❑	❑
6. I am aware of the energy (calorie) content in foods that I eat.	❑	❑	❑	❑	❑	❑
7. I try to stay away from foods such as breads, potatoes, and rice.	❑	❑	❑	❑	❑	❑
8. I feel that others would like me to eat more.	❑	❑	❑	❑	❑	❑
9. I vomit after I have eaten.	❑	❑	❑	❑	❑	❑
10. I feel very guilty after eating.	❑	❑	❑	❑	❑	❑
11. I think a lot about wanting to be thinner.	❑	❑	❑	❑	❑	❑
12. I think about burning up energy (calories) when I exercise.	❑	❑	❑	❑	❑	❑
13. Other people think I am too thin.	❑	❑	❑	❑	❑	❑
14. I think a lot about having fat on my body.	❑	❑	❑	❑	❑	❑
15. I take longer than others to eat my meals.	❑	❑	❑	❑	❑	❑
16. I stay away from foods with sugar in them.	❑	❑	❑	❑	❑	❑
17. I eat diet foods.	❑	❑	❑	❑	❑	❑
18. I think that food controls my life.	❑	❑	❑	❑	❑	❑
19. I can show self-control around food.	❑	❑	❑	❑	❑	❑
20. I feel that others pressure me to eat.	❑	❑	❑	❑	❑	❑
21. I give too much time and thought to food.	❑	❑	❑	❑	❑	❑
22. I feel uncomfortable after eating sweets.	❑	❑	❑	❑	❑	❑
23. I have been dieting.	❑	❑	❑	❑	❑	❑

	Always	Very Often	Often	Some-times	Ra
24. I like my stomach to be empty.	❑	❑	❑	❑	
25. I enjoy trying new rich foods.	❑	❑	❑	❑	
26. I have the urge to vomit after eating.	❑	❑	❑	❑	

Section 3



1 2 3 4 5 6 7 8 9 10

Please circle the appropriate number.

1. Looking at the pictures above which picture shows your current shape?

1 2 3 4 5 6 7 8 9 10

2. Looking at the pictures above, which picture shows the body size and shape you like to have?

1 2 3 4 5 6 7 8 9 10

Section 4

Pease read the statements below and circle the number to show haw often you are ci or have in the past been teased in the way described.
Unless you answered never to a question, rate how upset you were by the teasing.

These questions ask whether you have been teased by people at school.

1. **People at school have made fun of you for being heavy.**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

2. **People at school have called you names like "*fatso*"**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

3. **People at school have pointed at you because you were overweight.**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

4. **People at school have made fun of you by repeating something that you saic they thought it was stupid.**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

5. **People at school have made fun of you because you were afraid to do something.**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

6. **People at school have laughed at you because you didn't understand something.**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

These questions ask whether you have been teased by people in your family.

7. **People in your family have made fun of you for being heavy.**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

8. **People in your family have called you names like "*fatso*"**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

9. **People in your family have pointed at you because you were overweight.**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

10. **People in your family have made fun of you by repeating something that you said because they thought it was stupid.**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

11. **People in your family have made fun of you because you were afraid to do something**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

12. **People in your family have laughed at you because you didn't understand something.**

Never	Occasionally	Sometimes	Often	Very Often
1	2	3	4	5

How upset were you?

Not upset	A little upset	Somewhat upset	Quite upset	Very upset
1	2	3	4	5

Section 5

Please read the following statements and tick the one that best describes what you think about your body

I think I am much too fat ❑

I think I am too fat ❑

I think I am just about right ❑

I think I am too thin ❑

I think I am much too thin ❑

Section 6

Kids sometimes have different feelings and ideas.

This part of the questionnaire lists the feelings and ideas in groups. From each group of three sentences, pick one sentence that describes you ***best for the past two weeks***. After you pick a sentence from the first group, go on to the next group.

There is no right answer or wrong answer. Just pick the sentence that best describes the way you have been recently. Put a mark like this ✗ next to your answer. Put the mark in the box next to the sentence that you pick.

Here is an example of how this works. Try it. Put a mark next to the sentence that describes you ***best.***

Example:

- ❑ I read books all the time.
- ❑ I read books once in a while.
- ❑ I never read books.

Now carry on with the sentences below.

Remember, pick out the sentences that describe you best in the PAST TWO WEEKS.

- ❑ I am sad once in a while.
- ❑ I am sad many times.
- ❑ I am sad all the time.

- ❑ All bad things are my fault.
- ❑ Many bad things are my fault.
- ❑ Bad things are not usually my fault.

- ❑ Nothing will ever work out for me
- ❑ I am not sure if things will work out for me.
- ❑ Things will work out for me O.K.

- ❑ I do not think about killing myself.
- ❑ I think about killing myself but I would not do it.
- ❑ I want to kill myself.

- ❑ I do most things O.K.
- ❑ I do many things wrong.
- ❑ I do everything wrong.

- ❑ I feel like crying every day-
- ❑ I feel like crying many days.
- ❑ I feel like crying once in a while.

- ❑ I have fun in many things.
- ❑ I have fun in some things.
- ❑ Nothing is fun at all.

- ❑ Things bother me all the time.
- ❑ Things bother me many times.
- ❑ Things bother me once in a while.

Remember, describe how you have been in the past two weeks.....

- ❑ I am bad all the time.
- ❑ I am bad many times.
- ❑ I am bad once in a while.

- ❑ I like being with people.
- ❑ I do not like being with people many times.
- ❑ I do not want to be with people at all.

- ❑ I think about bad things happening to me once in a while
- ❑ I worry that bad things will happen to me
- ❑ I am sure that terrible things will happen to me

- ❑ I cannot make up my mind about things
- ❑ It is hard to make up my mind about things
- ❑ I make up my mind about things easily

- ❑ I hate myself
- ❑ I do not like myself
- ❑ I like myself

- ❑ I look O.K.
- ❑ There are some bad things about my looks
- ❑ I look ugly

- ❑ I have to push myself all the time to do my schoolwork.
- ❑ I have to push myself many times to do my schoolwork.
- ❑ Doing schoolwork is not a big problem.

- ❑ I never have fun at school
- ❑ I have fun at school only once in a while
- ❑ I have fun at school many times

- ❑ I have trouble sleeping every night.
- ❑ I have trouble sleeping many nights.
- ❑ I sleep pretty well.

- ❑ I have plenty of friends
- ❑ I have some friends but wish I had more
- ❑ I do not have any friends

- ❑ I am tired once in a while.
- ❑ I am tired many days.
- ❑ I am tired all the time.

- ❑ My schoolwork is alright
- ❑ My schoolwork is not as good as before
- ❑ I do very badly in subjects I used to be good in

- ❑ Most days I do not feel like eating.
- ❑ Many days I do not feel like eating.
- ❑ I eat pretty well.

- ❑ I can never be as good as other kids
- ❑ I can be as good as other kids if I want to
- ❑ I am just as good as other kids

- ❑ I do not worry about aches and pains.
- ❑ I worry about aches and pains many times.
- ❑ I worry about aches and pains all the time

- ❑ Nobody really loves me
- ❑ I m not sure if anybody loves me
- ❑ I am sure that somebody loves me

Remember, describe how you have been in the past two weeks.....

- ❑ I do not feel alone.
- ❑ I feel alone many times.
- ❑ I feel alone all the time.

- ❑ I usually do what I am told
- ❑ I do not do what I am told most time
- ❑ I never do what I am told

- ❑ I get along with people
- ❑ I get into fights many times
- ❑ I get into fights all the time

Section 7

Please can you tell us one thing you would like to get out of coming to the Traffic Light Group. (You can write more than one thing if you would like)

Thank you for filling in the questionnaire.

Please use the space below if there is anything else you would like to tell us:

Appendix H: Session Topics

Outline of session topics for the Traffic Light Group:

Session 1	Session 2	Session 3	Session 4	Session 5
Introduction to the programme	*Realistic Goal setting*	*The role of nutrition in managing weight control(1)*	*The role of physical activity in managing weight control*	*The role of nutrition in managing weight control (2)*

Session 7	Session 8	Session 9	Session 10	Session 11
Cue control in relation to eating (internal and external stimuli)	*The role of social support in sticking to the programme*	*Planning ahead for finishing the programme/ Problem solving difficult situation*	*Planning ahead for finishing the programme/ relapse prevention*	*Maintenance Recap of previous sessions*

Session 13
Follow-up - Review of programme and maintenance

Appendix I: **Differences in %BMI at the start of the group and change between start and end of treatment in %BMI for treatment groups I, II, III and IV.**

Differences in %BMI at the start of the group and change between start and end of treatment in %BMI for treatment groups I, II, III and IV.

	%BMI group I (n = 6)		%BMI group II (n = 7)		%BMI group III (n = 8)		%BMI group IV (n = 6)		Entire sample (n = 27)		1-way ANOVA F	P
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	2-tailed	
%BMI at start	191.18	(21.79)	199.16	(33.90)	199.59	(35.12)	175.69	(23.43)	192.14	(30.41)	1.16	ns
Change in % BMI between start and end of group	14.05	(7.76)	8.01	(7.50)	7.31	(6.54)	4.65	(4.06)	8.40	(7.09)	2.15	ns

Appendix J: Differences in main end of treatment variables between drop-outs and completers

Differences in main end of treatment variables between drop-outs and completers

	End of treatment (n=20)		Follow-up of treatment (n=7)		T-Test
Variable	Mean	SD	Mean	SD	P (2-tailed)
%BMI					.50
Mood (**Children's Depression Inventory**)	6.0	(1.20)	5.7	(1.21)	.29
Children's Eating Behaviour Questionnaire:					
Satiety responsiveness	2.59	(.28)	2.38	(.52)	.21
Fussiness	2.64	(.97)	2.44	(.86)	.20
Food Responsiveness	3.0	(.38)	3.11	(.89)	.11
Enjoyment of food	3.90	(.52)	4.20	(.73)	.31
Desire to drink	2.52	(.57)	2.75	(.97)	.22
Emotional undereating	2.71	(.51)	2.54	(.42)	.17
Emotional overeating	2.93	(.53)	3.01	(.65)	8.1232E-02
Piers-Harris Self-concept scale:					
Self esteem (PH total score)	55.75	(8.01)	56.52	(12.18)	.78
Physical appearance	50.75	(9.65)	49.53	(10.14)	1.22
Children's eating Attitude Test:					
Eating attitudes	15.13	(7.04)	18.06	(9.04)	2.93
Disordered Eating subscale	10.88	(6.20)	12.59	(6.00)	1.71
Bulimia subscale	1.88	(2.95)	2.06	(2.49)	.18
Oral control subscale	2.38	(1.30)	3.41	(2.60)	1.04
Green food consumption	4.64	(1.80)	3.18	(2.23)	1.46