

Family Based Interventions in the Prevention and Management of Childhood Overweight and Obesity: An International review of Best Practices, and A review of current Irish Interventions



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Introduction to childhood obesity

Prevalence

Ten per cent of the world's school-aged children are estimated to be overweight, and twenty five per cent of these are thought to be obese. There is also a major possibility that some of these children have or are developing multiple risk factors for type 2 diabetes, cardiovascular disease and a mixture of other co-morbidities prior to or throughout early adulthood. These trends have been linked with a variety of shifts in social, economic and physical environments connected to the "nutrition transition"¹ that is, rises in the use of energy dense produce².

The prevalence of overweight is significantly higher in economically expanded areas, but is rising considerably throughout the world³. Current figures on Irish children and teenagers revealed that one in five young people are overweight or obese⁴. Research by Whelton *et al*⁵ from the North South Survey of Children's Height, Weight and Body Mass Index (2001/2002) carried out in Ireland found that the highest prevalence of overweight was amongst 13year old girls (32%) and obesity amongst 7 year old girls (11%). The WHO surveillance project which was carried out in 2008, demonstrates high levels of overweight and obesity in 7 year old children. When categorised by the IOTF standards, 73% of girls and 82% of boys were of normal BMI while 19% of girls and 13% of boys were overweight and 8% of girls and 5% of boys were obese⁶.

Figure 1 Prevalence of overweight and obesity among school-aged children (5–17 years) in global regions. Overweight and obesity defined by IOTF criteria. Based on surveys in different years after 1990⁷.

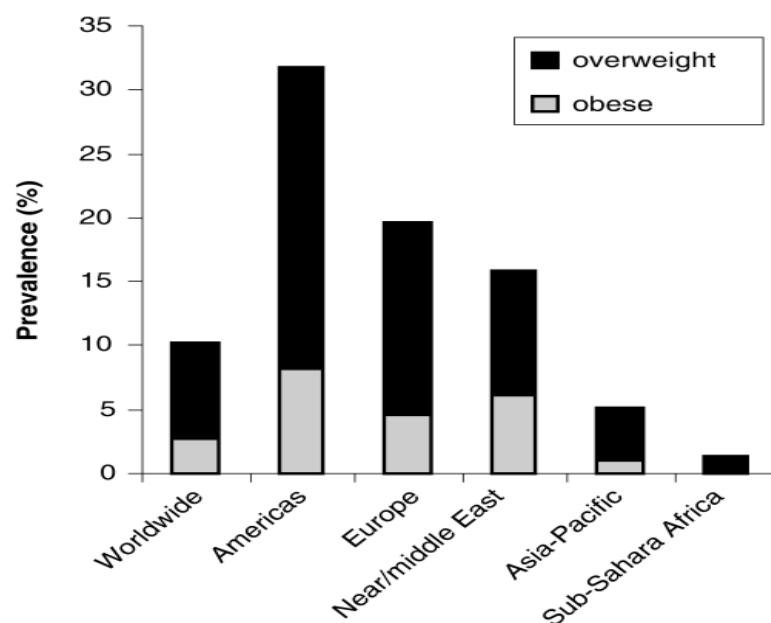


Figure 2 Prevalence of excess body weight in 13 year old boys and girls. Results from the Health Behaviour in School-aged Children Study⁸

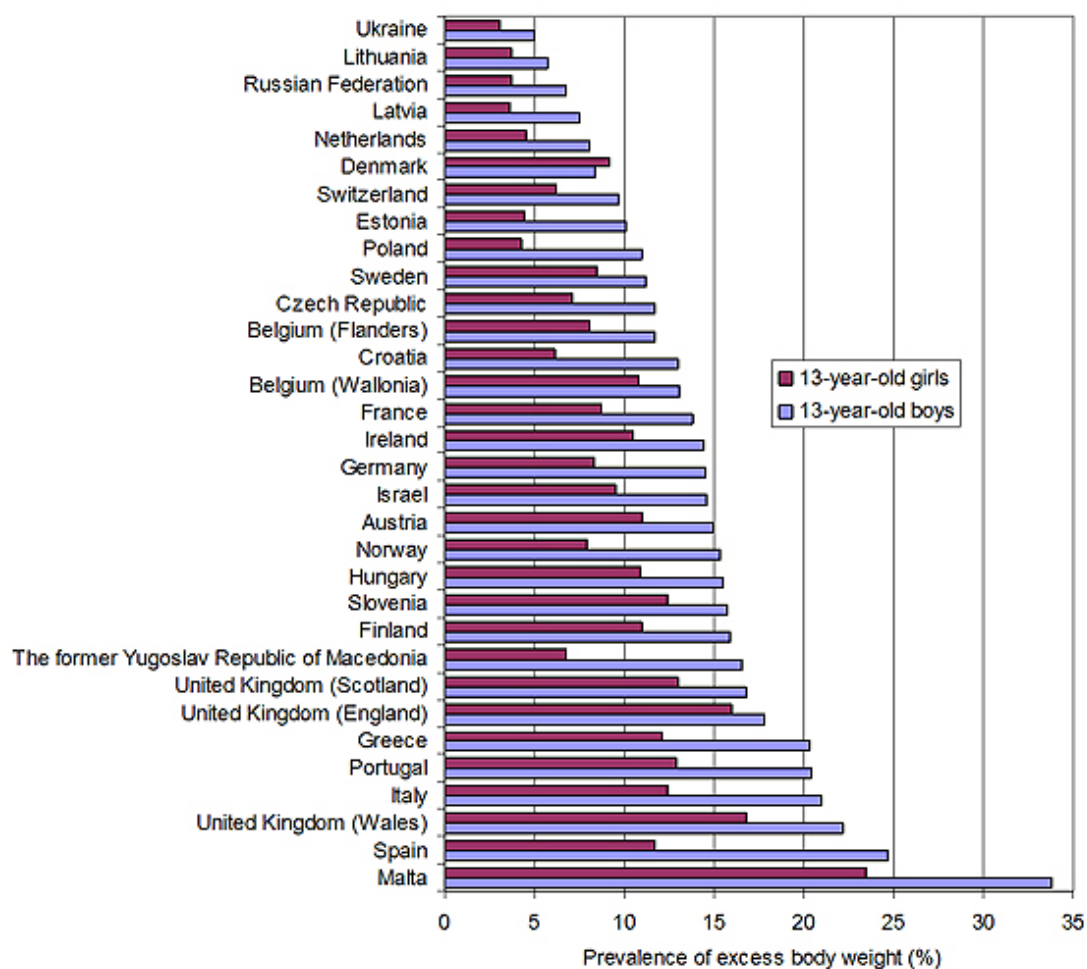


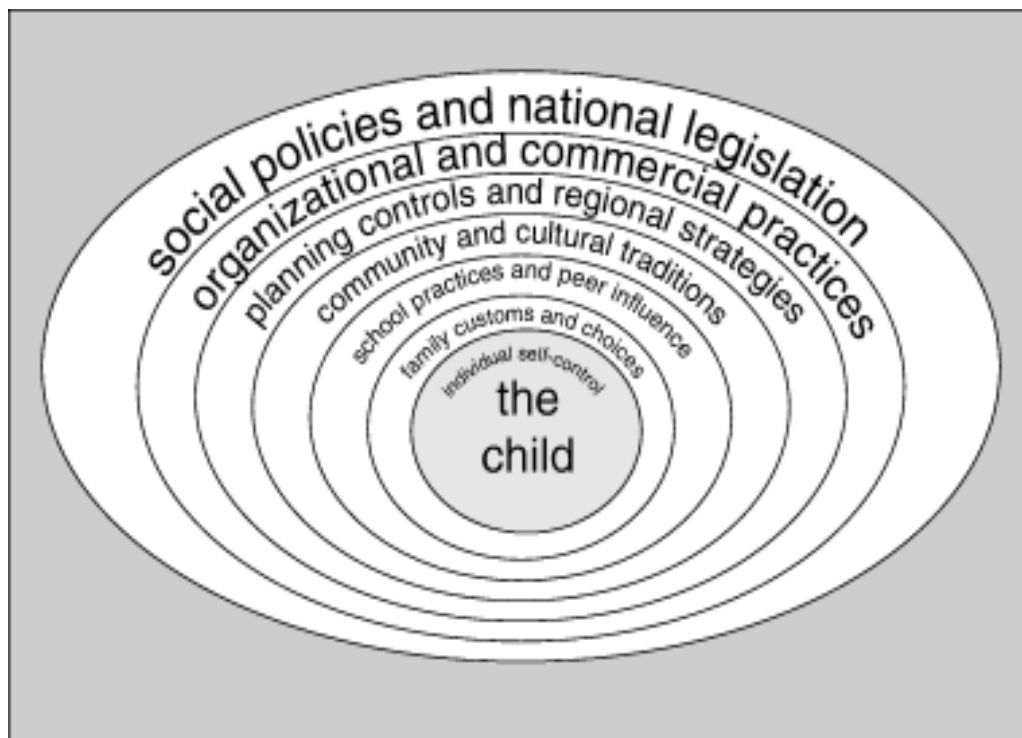
Table1: The international average and Irish prevalence of overweight and obesity among 13 year olds⁹

	13-year-olds	
	Ireland 2002	HBSC 2002 average
Overweight boys	10.5	12
Obese boys	3.9	2.4
Total	14.4	14.4
Overweight girls	8.4	7.9
Obese girls	2.1	1.2
Total	10.5	9.1

The Obesogenic environment

Obesity results from the interaction of a variety of factors, such as 'family demographics, parenting beliefs and practices, child television viewing and physical activity levels'¹⁰. The 'Obesogenic' environment refers to one in which there is readily obtainable high energy dense, appetizing food and use of effort saving and entertainment devices which reduce energy expenditure¹¹.

Figure 3 The opportunities for influencing a child's environment⁷.



Background

Identification, Prevention and Treatment

Identification: Body Mass Index (BMI)

As in other parts of the world, there is a need for agreement about assessment measures for childhood obesity in Ireland and at present no guidelines exist for assessing Irish children⁹. BMI (adjusted for age and gender) is the most realistic estimate of overweight in children, but needs to be interpreted with care because it is not a clear calculation of adiposity¹². BMI values in children are based on comparisons with population reference figures. Cut-off points are used for age and gender distribution. A range of cut-offs and reference figures are presently utilized. In the UK (1990 UK reference figures), obese children are classified with a BMI >98th centile and overweight children are classified with a BMI >91st centile. The majority of worldwide literature uses a categorization of BMI >85th centile of reference figures for at-risk of overweight and BMI >95th centile of reference data for overweight¹³. The International Obesity Taskforce (IOTF) proposed that the adult cut-off points (25 and 30 kg/m²) be related to BMI for age centiles for girls and boys to supply child cut-off points⁷.

BMI is used because it is reasonably easy to obtain height and weight measures and these assessments are non-invasive. It is a screening means for initial evaluation of body fatness, not a diagnostic assessment because BMI is not a direct measure of body fatness. BMI is not able to differentiate between increases in fat free mass and increases in fat mass¹³.

No recommendations have been made to suggest that waist circumference should be used as a screening tool for childhood obesity. However, the Scottish Intercollegiate Guidelines Network (SIGN) state that using waist circumference in conjunction with BMI will result in a more definite representation of both fat distribution in children and whether weight increase is due to an elevation in fat free mass or increases in fat mass¹⁴. They also suggest that "BMI should be used in community screening, BMI and waist circumference should be used in clinical

settings and screening at school entry and every three years should be carried out”¹⁴. In addition, The National Institute for Clinical Excellence¹² state that waist circumference can be used to provide supplementary information on the risk of developing further health conditions in the future.

Prevention:

Successful prevention of childhood overweight is the first move towards preventing obesity, and necessitates understanding and tackling of the ‘obesogenic environment’². The prevention of childhood overweight and obesity is crucial because these are known to have a significant impact on both physical and psychosocial health¹⁵. Hyperlipidaemia, hypertension and abnormal glucose tolerance arise regularly in obese children and adolescents¹⁶. Obesity in childhood is known to be an independent risk factor for adult obesity while overweight in adolescence is a more powerful predictor of risk than overweight in adulthood¹⁷. In a 15 year longitudinal study by Ulmer *et al*¹⁸ of tracking (*the tendency of a person to sustain their status or location within a group over time*) of cardiovascular risk factors between the ages of 19 and 96 years, effects were most marked for BMI in both men and women. Obesity prevention on a population based level can not only benefit the obese population but also non-obese people such as improving lifestyle activities which would protect against chronic disease in people who are a normal weight¹⁹. Doak *et al*² ask when should interventions be initiated and what prevention methods should be utilized? Firstly, prevention of overweight and obesity must rely on the modification of two factors, the energy content of the diet and an increasingly sedentary lifestyle¹⁵.

According to Flynn *et al*²⁰, a widespread health approach as well as individual treatment for severely overweight children or those with co-morbidities is required to combat the obesity epidemic, which prevails in our world today.

Diet

Efforts to prevent obesity through dietary means should include a large variety of community/public activities such as taxes on unhealthy food for the endorsement of healthy, nutritious foods; policies on school lunches, removal of unhealthy foods and drinks from vending machines in education facilities and the provision of healthier food choices (i.e. fruit and vegetables). Additionally, appropriate food labelling, restrictions on conflicting health claims, boundaries on the political support provided by the food industry, limitations or removal of advertising of unhealthy commodities to children, and evaluation of food industry incentives on marketing approaches should

also be implemented²¹. One of the fastest marketing ploys to advertise food to children is via the Internet, which is also one of the least regulated marketing outlets²¹. In Ireland there is already a ban on using cartoon characters in advertising of food to children. In addition, there is a statutory code that denotes that commercials must not use celebrities or sports superstars to endorse food or drink, except if this is part of a public health or education promotion. Regulation of advertising to children differs greatly, with the bulk of regulation aimed at television²¹.

Physical activity

Campbell *et al*¹⁵ concluded that concentration on strategies that encourage reduction in sedentary behaviours and increase in physical activity may be beneficial. Efforts to prevent obesity by physical means should include a large variety of community/public activities, for example: financial support for exercise amenities, the safeguarding of open built-up areas, creation of safer pedestrian and recreational areas and the provision of more cycling lanes and pathways²¹.

Ireland has already begun such efforts to prevent obesity. The Office of the Minister for Children has already implemented The National Play Policy. This policy aims at enhancing the knowledge of the importance of play and has helped development of neighbourhood play amenities over the implementation period (2004-2008). In addition, The National Recreation Policy offers support of positive recreational activities targeted mainly at adolescents aged 12 to 18 years and was commenced in September 2007.

The Department of Health and Children and the HSE launched The National Guidelines on Physical Activity for Ireland²² – ‘Get Ireland Active’ on June 11th, 2009 to support the promotion of physical activity in Ireland. This initiative was an outcome of a recommendation by the National Taskforce on Obesity.

The aim of The National Guidelines on Physical Activity for Ireland is to emphasize the value of physical activity to the health of Irish people and to outline recommendations for physical activity for people of all ages and abilities²². The World Health Organisation stated that physical activity ‘interacts positively with strategies to improve diet, discourages the use of tobacco, alcohol and drugs, helps reduce violence, enhances functional capacity and promotes social interaction and integration’²³. Frequent physical activity is the key to getting healthy and staying healthy, however, studies demonstrate that only a minority of Irish people take part in regular physical activity²⁵⁻²⁷. The 2007 SLÁN²⁷ report showed that only 41% of Irish

adults took part in moderate or strenuous physical activity for at least 20 minutes three or more times a week.

The National Guidelines on Physical Activity for Ireland²² are unique in that there are recommendations for children and adolescents, adults, adults with disabilities, and the elderly. According to the guidelines adults receive health benefits from 30 minutes a day (or 150 minutes a week) of moderate physical activity. The elderly and adults with disabilities should be as active as their ability will allow, they should aim to meet the adult guidelines of approximately 30 minutes of moderate exercise a day. Children and adolescents require at least 60 minutes (or 300 minutes a week) of moderate to vigorous physical activity. It is evident from the SLÁN and HBSC studies²⁵⁻²⁷ that the majority of Irish adults and children are not active enough to be healthy.

Regular physical activity reduces your risk of chronic diseases, such as coronary heart disease, type 2 diabetes, stroke, cancer, osteoporosis and depression. According to the 2008 U.S. Physical Activity Guidelines Advisory Committee regular physical activity reduces many health risks for everyone – children, adolescents, adults, people with disabilities and older adults, across all ethnic groups²⁸. Physical activity levels are a major public health priority and national guidelines on physical activity have also been developed in countries such as USA, Australia²⁹, and Canada³⁰.

Family

According to the National Guidelines for Community Based Practitioners on the prevention and Management of Childhood Overweight and Obesity (2006) parents, families and peers are crucial determinants of child health behaviour³¹. Poor maternal diet is now documented as a risk factor for the development of obesity, and especially abdominal adiposity, amongst children²³. Nutrition in pregnancy may have a role in the prevention of childhood obesity. There is convincing evidence that reduced intrauterine growth and development at an important stage in early life may have lasting repercussions on structure, physiology and function of a range of foetal tissues and organs which can lead to the development of a variety of conditions including obesity³².

The amount of women who begin pregnancy overweight or obese is also rising and obese mothers are more likely to have obese children²³. In addition, high maternal weight increases throughout pregnancy (> or =16 kg) were notably connected with elevated risk of overweight in Portuguese children³³. In a study of over 5,000 women who delivered in Galway between 2000 and 2001, 23% were overweight, 20% were

obese and 6% were morbidly obese at start of pregnancy³⁴. There is also research which suggests that increasing maternal hyperglycaemia in pregnancy is related to increased risk of childhood obesity at age 5-7 years³⁵. A high birth weight is connected with obesity later in childhood, as shown in a study in Iceland in 1988 and 1994, in which the children who measured over the 85th percentile at birth were more prone than other children to being overweight at the ages of 6, 9 and 15 years³⁶. According to Baird *et al*³⁷, serious health threats exist for average sized and underweight offspring who then quickly increase in weight during the toddler and school age years.

Increasingly persuasive evidence now suggests that breastfeeding protects against obesity in the child²³. Lower levels of obesity are found among infants and young children breastfed from birth than formula-fed infants³⁸. The National Guidelines for Community Based Practitioners on the prevention and Management of Childhood Overweight and Obesity (HSE)³¹ recommends that breastfeeding support measures need to be strengthened and parents require education and support to optimise infant feeding practices. There should be reinforcement of breastfeeding support and education for parents so they can optimise their infant feeding²⁰. There is also evidence that weaning before the age of 6 months results in rapid weight gain in early life, which may consequently elevate the risk of child obesity³⁹. Early weaning has also been linked with increased weight and body fat at age 7 years⁴⁰.

Intrauterine limits of foetal growth can bring about postnatal catch-up growth. Data from the Avon longitudinal study of parents and children (ALSPAC) cohort found infants who demonstrated catch-up growth between the ages of zero and two years were heavier and had added central fat distribution at five years compared to other children⁴¹. A later investigation of the group figures found the risk of obesity at age 7 was above two and a half times more probable in children who demonstrated catch up growth (odds ratio 2.60)⁴².

Early age of adiposity rebound has also been shown to be a risk factor for child obesity. Children show a fast increase in BMI throughout the first year of life. Following 9 to 12 months, BMI decreases and achieves a minimum, normally at 5 to 6 years of age before showing a steady increase all the way through the teenage years and for the most part of adulthood. The adiposity rebound is when the child is at their maximal leanness or minimal BMI³². Data from the ALSPAC cohort showed premature adiposity rebound to be autonomously linked with childhood obesity at age 7. In addition, children with early adiposity rebound before 5 years and 1 month were two times more likely to be obese at age 7 in contrast with children with an adiposity

rebound after 5 years 1 month. Children with premature adiposity rebound, by 3 years 7 months, were fifteen times more probable to be obese than children with an adiposity rebound after 5 years 1 month⁴².

Antenatal education programs and parent support during infancy and early childhood should be provided. Parents also need to be supported in understanding the importance of encouraging the development of positive mental health, and how to deal with particular issues, for example how to deal with the demands of 'pester power' from their children⁴³ and how encourage children to make specific alterations. Additionally, there is a need for support from schools and communities. Schools' should be committed to healthful lifestyles and implement policies regarding diet and exercise. They also need to ensure that the child's peers and their attitudes are facilitating the child in choosing appropriately, which means that the school needs to encourage activities that are contributing to health promotion⁷.

Screening

Screening for childhood overweight and obesity is not recommended. However, according to the Institute of Medicine⁴⁴ routine monitoring of childhood obesity by health care professionals should be carried out. While screening for obesity risk may help in aiming resources where they are most required, this could also lead to stigmatisation in the children who are picked out for individual attention⁷. Labelling someone as obese may lead to potentially negative reactions and emotional upset, which could lead to further weight gain¹⁹. Therefore if screening for childhood obesity is to be carried out efforts to prevent stigmatisation could include that the measurements be done in a private area and only the child's guardian will have access to the results only via a written request.

Socio-economic Status

The prevalence of obesity differs remarkably across countries with different socio-economic status levels⁴⁵. In addition obesity levels are rising in developing countries. The significant disparities, in the prevalence throughout countries imply that social, economic and environmental issues are central influences to the epidemic⁴⁵. Within certain populations, different socio-economic classes are at different risks. In low socioeconomic countries, obesity rises severely as they get wealthier, and the risk of obesity moves down from groups with higher socioeconomic status to those with lower. These inclinations may mirror the relative accessibility of bulk-produced foodstuff and lessening manual labour as nationwide income raises⁴⁵. In most

countries, however, obesity is more prevalent among people of lower than higher socioeconomic status, and the same appears to be true of type 2 diabetes⁴⁵. There is support that disproportion exists in the using of fruit and vegetables; with poorer use among children from lower socio-economic homes⁴³.

The National Survey of Lifestyles, Attitudes and Nutrition (SLAN) 2007, found that there was a trend for increased fried food intake in lower social class groups and more for fruit and vegetable intake in higher social class groups in Ireland²⁴.

Low earnings may also limit availability of healthy food, and of using the equipment necessary for food storage and preparation. Household income also shows associations with food availability and in a roundabout way controls children's dietary patterns and weight. Healthy foodstuff is costly and involves additional time to prepare¹⁰. Food deserts ('areas of relative exclusion where people experience physical and economic barriers to accessing healthy food') are more likely to be found in areas of socio-economic deprivation. Opportunities to exercise may also be limited in such environments; for example, there may be nowhere safe to play, no facilities for physical activities outside school and less finances to participate in such activities⁴⁶.

In Ireland, the Healthy Food for All Initiative has been developed due to the increasing awareness of food poverty among low-income families. Food poverty has many consequences for health, education and social participation⁴⁷. The goal of this intervention is to support local projects, which promote availability and access to healthy and affordable food for low-income groups⁴⁸.

Targets for Prevention

Minority groups should be incorporated in population-based prevention for example pre-school children²⁰. The Department of Health and Children is due to publish a National Nutrition Policy Document, which would have 2 major focuses, one on children and one on minority/ disadvantaged groups. As a policy document it is anticipated that it will contain clear guidelines for healthcare professionals and high-level government policy makers, as well as population level nutrition and physical activity targets, all targeted to prevent the growing obesity problem.

In the UK, a report by the Chief Medical Officer, Department of Health in 2003 indicated that the prevalence of obesity was nearly four times more frequent in Asian children than white children⁴⁹. Examination showed that the prevalence of overweight

(including obese) among Black African (42%), Black Caribbean (39%) and Pakistani (39%) boys, was particularly more than that of the general public (30%). Prevalence was found to be highest in Black Caribbean (42%) and Black African (40%) girls, who had a markedly higher prevalence than that of the general population (31%).

Obesity is more frequent in individuals with learning difficulties than in the general public¹². In children in the UK with learning difficulties, obesity (based on the 95th percentile for age) has been estimated to be 24%⁵⁰. Children with a physical disability may be at increased risk of obesity, particularly in terms of mobility, which makes exercise difficult⁴⁹.

Treatment:

General

Prevention and treatment of overweight and obesity, to some extent may be less difficult in children than in adults as children are still growing in height and a child can accomplish decreases in adiposity without reducing energy intake². According to the NICE Guidelines¹², it is vital that the child is supported so success can be achieved. There must be a patient-focussed, individualised approach, which encompasses confidence building and ensures confidentiality. They advise multi-factorial interventions which should comprise of 'behavioural, psychological and lifestyle' alteration approaches. In addition, behavioural interventions appear more successful when parents are included¹⁵. The main recommendations from NICE¹² suggest that when deciding how to treat obesity one should take into account the age of the child, the extent of overweight/obesity and the existence of other medical conditions.

SIGN¹⁴ has drawn up guidelines which recommend that in most obese children (>98th centile) weight maintenance is an acceptable goal and the results should be revealed to families on the BMI percentile chart over time. They also recommend that obese children more than 7 years of age, who show sustained weight maintenance and who are looked after by secondary care facilities, a modest weight decrease, not greater than 0.5kg per month is acceptable. Patients should be assessed for medical causes of obesity and any current medical problems connected with it. It is important to recognize that obesity is a chronic disease and consequently, regular appointments, continuous observation and reinforcement will be necessary for success, however this will not guarantee it⁵¹.

1. Diet

According to WHO²³, dietary management results in many positive outcomes, however, there are also some negative outcomes that may result such as 'loss of lean body mass, reduced linear growth and exacerbation of eating disorders'. Weight maintenance programmes (with dietary therapy) are better left until after puberty and very obese/moderately obese children with extra medical conditions should be on a varied low calorie intake²³. The National Children's Food Survey in Ireland (2003-2004) found that one fifth of Irish children's energy intake from food comes from sweets, snacks and biscuits⁵². Limiting the consumption of foods that are high in fat and simple sugars best achieves weight loss along with substituting these foods with lower energy, high fibre foods for example fruits, vegetables and whole-grains. The National Children's Food Survey in Ireland showed that daily intake of soft drinks averages about 2 glasses of chiefly sugar-containing drinks⁵². Water should be given as the main drink, and high sugar containing drinks, as well as soft drinks and fruit drinks, should be restricted. There is a positive relationship between the consumption of sugar sweetened drinks and adiposity in children⁵³. Over a 2 year period it was shown that the odds ratio of becoming obese among children elevated to 1.6 times more for every supplementary can or glass of sugar sweetened drink that they drank every day⁵⁴.

Weight maintenance can only be accomplished by lifelong behavioural alterations including healthier eating¹⁴. Aiming at specific behaviours such as consuming smaller portion sizes, instituting a regular mealtime and snack routine, choosing healthier foods when eating in restaurants can facilitate overweight children and their families to accomplish weight loss⁵⁵. Research carried out by Kellogg's⁵⁶ conducted in the UK, France, Italy and Sweden found that obese children were less likely to consume breakfast. Obese children who failed to eat breakfast were also found to more regularly snack on foods high in fat and calories⁵⁶. Alterations in dietary patterns, consumer choices and forms of food chosen for all the family will help the child to control his or her own food consumption. It is imperative that the term 'dieting' is not used and that there is a steady, positive change in the child's eating behaviours⁵⁷.

Other approaches that have been researched for the treatment of childhood obesity include alternative diets such as low Glycemic Index (GI) diets. However until more clinical trials are carried out to evaluate the long-standing safety of a low-carbohydrate diet for overweight children and adolescents, this type of diet is not suggested for use in children⁵⁵. Research also shows that another fashionable diet, the reduced-glycemic load diet, may be a feasible option to a usual diet for the

management of overweight children however, again more studies need to be carried out prior to it being advised for treating overweight children⁵⁵.

In Ireland, Non-Government Organizations (NGOs), such as the Irish Heart Foundation, and government bodies, such as the Health Service Executive (HSE), have used an integrated approach to public health campaigns. Instead of aiming the campaign at a specific area, for example lowering salt consumption, campaigns tend to focus on general holistic health messages, as integrated communications are less confusing to consumers. 'Little Steps Go a Long Way'⁵⁸ was recently launched by the HSE, Safefood and the Health Promotion Agency (HPA) and focuses on healthy eating and physical activity for all ages with particular reference to the family unit. This is discussed in more detail in the section under current interventions.

2. Physical Activity

Increasing physical activity and decreasing sedentary activities can enhance the efficacy of obesity treatment and can autonomously decrease morbidity²³. Physical activity as part of everyday life in comparison to planned physical activity is vital for maintaining weight loss, and compliance in the long-term is liable to be with physical activity incorporated during everyday life²³. Inactivity is connected with decreased energy output plus this in turn can lead to more snacking and more exposure to advertising of unhealthy foods. Children should aim to increase activity and decrease sedentary behaviours aiming for at least 60 minutes of regular, moderate- to vigorous-intensity each day^{22,28}. However, it should be pointed out that the activity of children consists of 'intermittent and spontaneous play' rather than continuous stints of physical activity, and hence energy expenditure could be more than it's calculated to be⁵⁹. Parizkova *et al*⁶⁰ recommend that exercise programmes need to be tailored to the individual child.

Encouragement and help from the child's family, peers, exercise educators and teachers can all add to the lifelong beneficial effects of exercise therapy⁷. Sports that are competitive might not be suitable for the obese child, and may worsen emotional problems particularly if they have to partake in a game which may lead to 'stigmatisation' if they are obviously excluded⁷.

Clear-cut methods such as restricting television viewing, videotape and video game use can significantly add to reducing the incidence of childhood overweight⁷. The American Academy of Paediatrics⁶¹ recommends that 2 hours a day should be the most television and video time a child should be allowed. This can be substituted with

different fun filled activities. Edmunds *et al*⁶² found that emphasizing a reduction in sedentary activities was linked with increased weight loss rather than emphasizing an increase in physical activity.

3. Family involvement

The family habits will affect the child's dietary behaviour and any successful management must allow for this. Participation of parents in management of obesity in childhood is required for weight loss both in the young child and to a lesser degree in teenagers⁷.

Transformed dietary behaviours in the entire family including encouragement of the child and parental participation for a more healthful way of life are key factors in child weight loss⁷. The child must not have restricted 'rules' or be isolated within the family and should be taking part in mealtimes and consuming similar food with the rest of the family. There is growing support that management of childhood obesity with the parents as the only mediators of change is more successful than a child- focussed intervention. Recommendations include encouraging the child to participate in meal preparations and planning and the family should consume regular meals in an agreeable setting with no interruptions. In particular, meals should not be consumed in front of the television⁶¹. Parent /carers must observe and prevent overindulgence and unhealthy eating behaviours²³. Potential problems to parental involvement are that of cultural and emotional origin for example parents may not identify that their child is obese or parents may accept obesity but reject that this is of any consequence²³.

Family activity should be pleasurable and be suitable for all the family. The Voice of Young People – A Report on Children's Attitudes to Diet, Lifestyle and Obesity published by Pfizer as part of their 'Way2Go, for a healthier you' programme reported that children felt exercising together as a family was important for health⁶³.

Environmental factors play a significant role in addressing the problem of childhood obesity. The Report of the National Taskforce on Obesity⁹ states, 'creating environmental changes that support long-term changes in individual eating and activity habits are necessary for both adults and children if the current trends in obesity prevalence are to be tackled successfully'. The child's families and carers should also be given appropriate literature, with regular evaluation and observation. If the family is ill equipped to help the child then weight loss is not likely⁹.

4. Behavioural therapy with Family Involvement

Behaviour change is included in the majority weight management interventions. According to WHO²³, a mixture of behavioural treatment methods in combination with other weight reducing interventions has been shown to be successful over a one-year period. They also state that there is incomplete evidence for the efficiency of lengthening behavioural treatments outside this time²³. Ash *et al*⁶⁴ has shown that a group behaviour based lifestyle intervention programme was as effective as intensive individualised dietetic intervention in terms of weight loss and improvements in self-efficacy among cardiac patients. At 1-year follow-up the group intervention delivered improved weight maintenance. It was also the more cost effective approach.

Other forms of management incorporate 'cognitive behavioural therapy, family therapy, specialised schools, hospital treatment and residential treatment'. In some situations, approaches are more successful if given in more organized surroundings, using a planned mixture of beneficial techniques however this is best set aside for older children who do not mind being away from home and can make friends easily with others²³.

Diet and activity alterations need to be offered within the structure of setting real and quantifiable aims that are reinforced with daily monitoring of the required behaviour changes and use incentives to aid with nourishing motivation⁵⁵. Even though a number of people may perhaps develop intent to alter their health behaviour, they might take little action. This discrepancy has been called the "intention-behaviour gap."⁶⁵

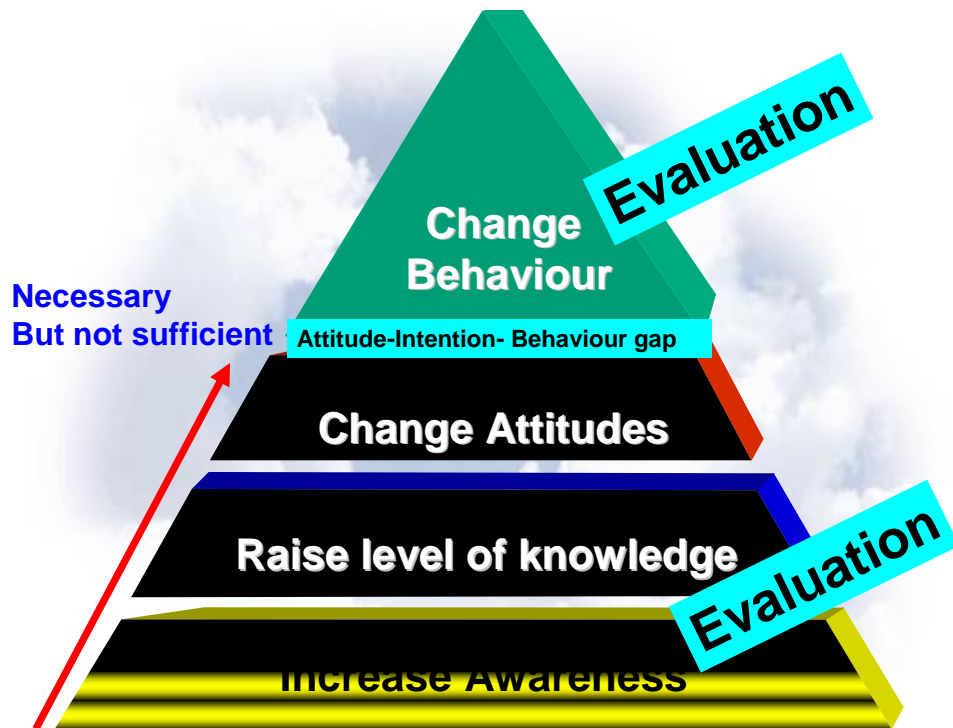


Figure 4 (Prof Pat Wall, MPH Obesity Lecture 2007⁶⁶)

5. Pharmaceutical treatment

Numerous drug treatments for adults have been considered for use in adolescents, but the majority of these have not yet been approved²³. It has been publicized that in 7-12 year olds, Orlistat and low fat diet advice was successful for weight loss at 12 weeks. Also, in 12-16 year olds Orlistat and a hypo calorific diet is equally effective as diet and physical activity at 3 weeks¹². Drug treatment is not suggested for children younger than 12 years. In children younger than 12 years, drug treatment should only be given in certain situations such as if there are serious co morbidities (such as sleep apnoea or raised intracranial pressure). Drug treatment should only be given in specialist paediatric environments, by multidisciplinary teams with knowledge of administering drug treatment to children. If Orlistat or sibutramine is given to children, a 6–12-month trial is suggested, with regular examination to review efficiency, unfavourable effects and adherence. Following the commencement of drug treatment in acute care, it may be sustained in primary care if local conditions and/or licensing permit¹².

6. Surgery

Surgery is not yet recommended for use among children and adolescents with common forms of obesity. The safety and effectiveness of surgical treatments have not been sufficiently established in these patients groups. Surgery should be

considered only when all else has failed, when children have achieved adult height and when severe, potentially life-threatening complications of obesity are present^{7,23}.

According to NICE¹² surgery for obesity should be commenced only under a multidisciplinary team of health professionals who are specialists in paediatric preoperative evaluation, including a risk–benefit examination that consists of avoiding complications of obesity, and professional evaluation for eating disorder(s). The multidisciplinary team should also be competent in giving information on the surgeries, including related risks, regular postoperative evaluation, including professional nutritional and surgical review, the treatment of co morbidities, emotional support pre and post procedure, and providing information on or availability to cosmetic surgery (such as apronectomy) where suitable¹².

Surgical care and review should be centred on the child and their family's requirements. All children should have had a complete 'psychological, education, family and social evaluation before having bariatric surgery. A complete health assessment as well as genetic testing should be carried preoperatively to eliminate uncommon, treatable reasons for obesity¹².

Aim of Review

The aim of this review is to identify current family based best practice internationally for the prevention and treatment of childhood overweight and obesity and to examine current Irish Programmes so that best practice recommendations can be drawn up.

Interventions

- Family based interventions or school-based interventions with parental involvement.
- Children aged < 14 years who were overweight and obese and their families
- The target populations were children, parents, teachers, and a combination of these.
- Any intervention that aimed at preventing and treating obesity in childhood was considered for inclusion. Physical Activity, dietary, behavioural, problem solving, family therapy and multi-component interventions were included.

Hypothesis

That family-based intervention is necessary in the prevention and management of childhood obesity.

Research Questions

Internationally, what family based interventions characterize best practice in promoting healthy weights in children and youth for the prevention and treatment of obesity?

1. Diet/ eating pattern

Data connecting behaviour patterns of food consumption and obesity are limited and as a result of the high interrelationship between dietary exposures most research is based on cross sectional relationships. Yet it is obvious that routines of eating in both adults and children are transforming, and moving away from the more conventional family meal environment⁶⁷. Research has indicated that American children ate one-quarter of their food away from the family residence. Older children ate a higher quantity of meals cooked at home, increasing from '18% for preschoolers to 26% for school-age children and 27% to 30% for adolescents'⁶⁷. A family based intervention program which targeted raising awareness of eating a low fat, low cholesterol diet and increasing activity and which was evaluated against a control group who were given general health education showed a statistically significant difference after 12 weeks in favour of the intervention in terms of the percentage of daily calories from fat⁶⁸.

2. Physical activity/sedentary behaviours

A study by Rodearmel *et al*⁶⁹ showed that a family based intervention which aimed at increasing steps and cereal consumption (for breakfast and snacks) to reduce weight gain in children and adults. This intervention was successful over a 14 week period and had positive impacts on some indicators of obesity. Target setting and incentives together with encouraging family environments can be the most successful strategies to altering behaviours⁵⁵.

Television viewing and video games

Jago *et al*⁷⁰ highlighted that children of 6 and 7 years are at the age when TV watching and physical activity may significantly influence BMI. They have detected that there are noteworthy relationships between hours of TV viewing and hours of physical activity. Physical activity was negatively linked with BMI overall. Obesity can be facilitated by television watching as it may lead to increased energy consumption and prompts to eat either throughout watching⁷¹, or due to food advertisements in programme breaks⁷².

In Ireland 84% of all advertisements of foodstuffs aimed at children included foods high in fat, sugar, salt or a mixture of these⁷³, and this advertising has shown to effect children's food choices, what they buy and their eating habits^{74,75}. Advertising is

successful in swaying food selection made by children and their families, but the nutritional worth of much of the foodstuff aimed at children often does not meet the requirements for a healthy diet. It is difficult for parents to influence their children's food preferences as advertisers, fast food restaurants and manufacturers are openly promoting the consumption of foods that are unhealthy. Parents are often overwhelmed by requests from their children and surrender to alleged 'pester power'⁴³.

The preschool years are a key period of time in which to initiate interventions to decrease television watching, as behaviour and routines are being established and it is also the period at which television watching seems at its most⁷⁶. Data collected in the USA from the NHANES study (1999 - 2002) has revealed that 30% of 2 -5 year olds view 2 hours of television/videos per day and 8% view greater than 5 hours a day⁷⁶. After decreasing the hours spent watching television, obesity has been shown to be reduced⁷¹. Viewing greater than 2 hours of media per day was positively linked to being overweight or susceptible to overweight and greater skin fold thickness in children aged 2-5 years⁷⁷.

Research completed by Robinson⁷¹ established a direct relationship between television watching and increasing adiposity. The intervention comprised of 18-classes incorporated into the school syllabus (with parents involved), to decrease television watching, videotape, and video game use during a 6-month period, without encouraging other physical activities as substitutes. Electronic television time limiting equipment was used to supervise and limit television and video time. Ninety percent of the children from the intervention group took part in 'television turnoff' and 67% did not watch television for 10 days. In contrast with controls, students in the intervention group showed noteworthy reductions in BMI, triceps skin fold thickness, waist circumference, and waist-to-hip ratio⁷¹.

Epstein *et al*⁷⁸ have also stated that decreasing television watching and computer use may have a significant function in decreasing BMI and reducing the incidence of obesity in children, mainly associated with alterations in energy consumption. Normal media use was calculated throughout a 3-week timeframe and then staff set weekly time limits for watching television or using computers. Limits were decreased by 10% of the normal sum per month for children in the intervention group until the limit was decreased by 50%. Students in the intervention group earned \$0.25 for every half hour under the limit, which could amount to \$2.00 per week. Parents were educated to commend the child for decreasing television watching and for taking part in other activities. A star chart was also used to strengthen reductions already made. The star

charts were ceased after the 6 months, and alterations were sustained by way of newsletters and by commend from parents for their child's behaviour changes. The intervention group were given suggestions for substitutes to inactive behaviour, a personalized monthly newsletter with tips to decrease inactive behaviour, and guidelines about how to reorganize the home lifestyle to decrease the availability of inactive behaviour. The control group were offered open access to media and were given \$2.00 per week for taking part, which was autonomous of behaviour change. Control families were given an information sheet, which supplied parenting guidelines, 'sample praise statements', and suitable child centred activities. Age- and sex-standardized BMI (zBMI), television watching, energy consumption, and physical activity were examined every 6 months throughout the 2 years.

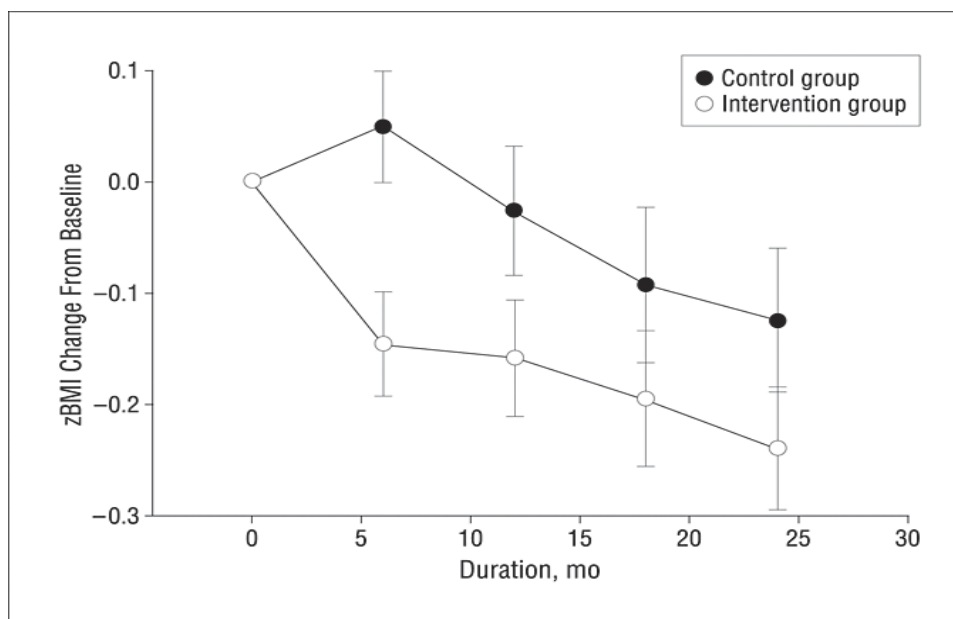


Figure 5 shows change in zBMI from baseline in the intervention group and in the control group over two years. Note the continual decline in zBMI, long after the 6 month intervention had ended⁷⁸.

These findings (figures 5 and 6) show that television viewing and computer use can be modified in children, and that parental participation can influence behaviour change. Interventions where there is parental participation results in enhanced behaviour change and in due course to the prevention of obesity in children.

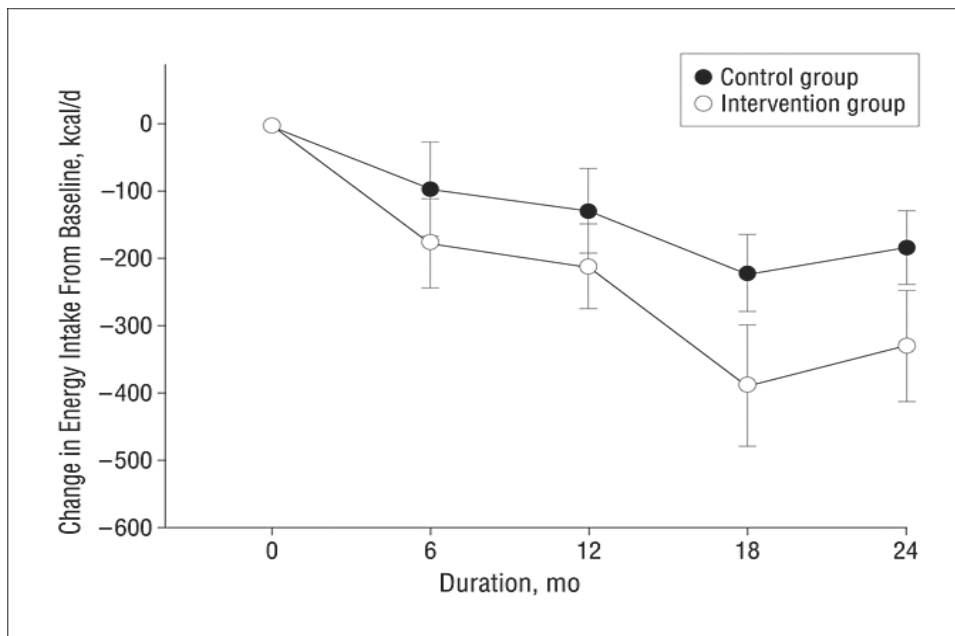


Figure 6 Reduction in energy intake for the intervention and control groups over time. A statistically significant difference in the rate of change in energy intake by group was observed ($P < .05$). Data are given as mean (SEM)⁷⁸.

Due to the growing epidemic of childhood obesity and other health problems connected with television watching, the American Academy of Paediatrics (AAP) has published 'national guidelines' for parents to reduce their children's overall time spent using media to no greater than 1 to 2 hours of good quality programmes a day for children 2 years of age and older⁶¹. There may be exclusive rewards to lifestyle alterations that modify the family situation, including media use, in which children can learn more healthful behaviours that supply the foundation for lifelong healthy eating and exercise routines and a weight within healthy ranges⁷⁸.

Decreasing television watching could influence energy consumption by reducing prompts to eat and by minimising exposure to advertisements⁷². A major recommendation is to minimise advertising of energy-dense, nutrient deprived foods high in fat, sugar and salt from 06:00 – 21:00 hours, as called for by the National Heart Alliance and the Irish Heart Foundation⁴. Other interventions suggested include the support of parents to educate their children on healthy eating and the influence of advertisements, and autonomous observation of publicity and media. As earlier results from research studies in children have revealed, the above may be effective, in preventing childhood obesity⁷⁷.

3. Family Involvement

A review by Kitzmann & Beech⁷⁹ looked at 31 family based interventions in which all except a minority involved parents in combination with behaviour change techniques to alter children's eating and exercise habits. They found that family based approaches, which involved parents facilitating change in child behaviours related to exercise and eating habits were successful in aiding weight loss or alterations in these types of behaviours in comparison to control groups. Some of the interventions focused on a more general parent training or looked at universal family functioning.

Also, Golan & Crow⁸⁰ found that the management of childhood obesity with parents as the only mediator of change worked well over the longer term. Parents should be the core change *mediator* in interventions, because their participation is important for the generation of a healthy home-life and diet including physical activity patterns, and changes in their children's habits and weight over the long term⁸⁰. Similarly, a study by Golan *et al*⁸¹ concluded that the treatment of obesity in children with the parents being the exclusive mediators of change results in the child's behaviour improving in addition to increased weight loss in comparison to using the conventional method of treatment where only the children participated in the group sessions. Studies including interventions of behavioural therapy aimed at children and parents jointly or the parents of children alone resulted in more weight loss⁸². McLean *et al*⁸³ also found that parental involvement is linked with weight loss in children and that by using a larger range of behaviour change methods resulted in improved weight loss for parents and their children. However, this was a limited literature search which may have prejudiced the findings of their review.

In addition, it is worth noting that families who join the majority of family-based interventions tend to be better functioning and are more likely to sign up and less likely to leave the intervention programme. Some families may be restricted by unproductive parenting skills and therefore unable to benefit from the program⁷⁹. They also state that family-based interventions can work better or be useful for a more diverse range of families—if researchers can progress from a “one size fits all” approach to one that includes different ways of family functioning⁷⁹.

Suggestions for further studies include examining the effectiveness of family participation, which may be different with age groups and gender⁸³. According to Kitzmann & Beech⁷⁹ progress in family interventions in childhood obesity should emphasise attention on the type of parental involvement in treatment for example if parental participation alters parent behaviour or parental skills and if these alterations are associated with weight loss in children. Kitzmann & Beech⁷⁹ concluded that research should now be questioning how and to what degree the parents should be

involved in treatment. Specifically this should address whether methods of teaching parents behaviour change techniques should be expanded although there has been concern from researchers that “more is not necessarily better”. Goldfield *et al*⁸⁴ found that a family-based, behavioural program using group treatment only is a more cost-effective way in treating childhood obesity than incorporating both group and individualised treatment.

4. Parental Beliefs

A child’s weight is affected by a parent’s beliefs about children’s nutritional needs. A study by Baughcum *et al*⁸⁵ found that several beliefs and practices about feeding could be linked with the onset of obesity in childhood. In this study the mothers all had beliefs that “bigger is better” for their infant or toddler. They saw that the heavier their baby was the healthier they were and that it also reflected that they were more capable mothers. Interestingly, this idea that ‘bigger is better’ was particularly emphasised in the views of overweight mothers. In addition, a non-randomised postal follow-up survey to the DIT-Coombe Hospital Infant Feeding Study found that the bulk of mothers had knowledge of the long term health repercussions of their infants diet, however they did not deem that their child’s diet was as powerful an influence as the other aspects (physical activities in childhood and adulthood, smoking and diet in adulthood). Less than 30% of mothers believed breastfeeding and weaning age to be vital to health in adulthood⁸⁶.

Baughcum *et al*⁸⁵ stated that parents who provide food to ‘satisfy their children’s emotional needs’ or to encourage better behaviour in their children may give rise to obesity by altering their children’s capability to control their own food consumption. In this study, these parents were from low-income households. The authors also concluded that approaches used to change child-feeding habits should also consist of tutoring of grandmothers. In addition, a mother’s emotional food consumption and their BMI were positively linked to the emotional food consumption of their sons.

According to Davidson & Birch⁸⁷, a parents’ belief about their child’s weight status and limits to food are linked with harmful self- judgments amongst girls. Public health interventions that add to parent’s understanding of childhood overweight without also giving helpful and guilt -free substitutes for tackling child weight problems may be harmful to the child’s psychological health⁸⁷. The Irish National Teens’ food survey reported that ¾ (n=35) of parents of overweight teens and 1/3 (n=9) of parents of obese teens thought their teenagers weight was fine. Only 56% of parents of obese

teens, indicated that they thought their teens weight was not correct for their age/height⁸⁸.

5. Behaviour change

Motivational interviewing (patient- focussed counselling intervention) can possibly assist families involved in a behavioural weight-management program to more successfully deal with ambivalence to resistance. It can help in altering behaviours, which will include more healthful dietary behaviours, and increasing the amount of physical activity. The aim of motivational interviewing is to help families articulate their own grounds for or against recommended behaviour alterations and then think about how these reasons either support or disagree with their main aim for attaining a healthier weight. However, it must be noted that extensive research is still required to supply confirmation of its effectiveness⁵⁵.

A family based behaviour modification treatment (8 months) conducted by Epstein *et al*⁸⁹ showed that parents from the parent and child group lost significantly more weight during the program in comparison to the other 2 groups (child group alone or control group). At follow-up (13 months) the parent and child group was less overweight than the control group.

A study by Kirschenbaum *et al*⁹⁰ in which parents with children ages 9-13 years were involved in a behavioural weight loss program showed that children in the mother and child groups and the child only group lost a significantly higher amount of weight in contrast to the children in the control group who increased in weight. This study comprised of nutrition education, self-monitoring of food, increasing physical activity, stimulus control, reducing eating, preplanning meals and exercise, self reward, coping ability skills, assertiveness training and relaxation training.

Wadden *et al*⁹¹ performed a study, which consisted of nutrition, exercise and behavioural modification with different amounts of parental participation. Children (mean age 14 years) were seen alone, the mother and child seen separately, or the mother and child seen together. The latter group of children showed 3.7kg weight loss after 16 weeks compared to 3.1kg weight loss in the group where the mothers were seen separately and 1.6kg where the child was seen on their own. Despite the differences among weight losses were not statistically significant; it was shown that the more sessions attended by the mothers, the more weight loss was shown in their daughters⁹¹.

Flodmark *et al*⁹² used family therapy as a treatment for obesity in childhood and this resulted in significant weight loss in children if the treatment started at 10 to 11 years. The procedures used here assisted the family's own efforts to adjust their lifestyle and willingness for change and take responsibility. They also stated however, that the results of this study need to be confirmed by further research before they can be generalised and used in treatment⁹².

Epstein *et al*⁹³ found that problem solving did not result in useful child weight control when the parent and/or child are given this type of training. However, in 1998 Graves *et al.* found that children's weight loss was superior when their parents were given problem-solving skills. The children of parents at whom problem-solving interventions were aimed at showed greater weight loss. However, when problem solving was exercised with the parents and children jointly or children alone, weight loss did not improve. Berry *et al*⁹² reviewed studies using these techniques and found that many of them were methodologically weak which made it difficult to make conclusions.

The aim of a recent study conducted in Australia⁹⁴ was to determine whether ascertainment of childhood obesity by surveillance followed by structured secondary prevention in primary care improved outcomes in overweight or mildly obese children (the LEAP 2 randomised controlled trial). Almost 4000 children visiting their general practitioner were surveyed for BMI and of these, 258 children aged between 5 and 10 years who were overweight or mildly obese were either randomized to intervention or control groups. The intervention included four standard consultations over 12 weeks targeting change in nutrition, physical activity and sedentary behavior supported by purpose designed family materials. The outcomes from this study showed that primary care screening followed by brief counseling did not improve BMI, physical activity or nutrition in overweight or mildly obese 5-10 year olds. The authors concluded that it would be very expensive to implement this strategy. It may be possible that the intervention intensity and duration were insufficient to impact any outcomes. Sustained BMI reduction has been observed in interventions which occurred over 9-12 months^{95,96}.

Sleep Deprivation

A systematic review and meta-analysis conducted by Chen *et al*⁹⁷, found that there is a strong link between short sleep duration and elevated risk of childhood obesity. In addition, a study by Taveras *et al*⁹⁸ concluded that daily sleep times below 12 hours throughout early years is emerging as being a risk factor for overweight and adiposity in preschool-aged children.

While individual sleep needs can vary, the amount of sleep suggested by sleep experts for particular age groups is: 18 months – 3 years 12-14 hours/night, 3-5 years, 11-13 hours/night, 5-12 years, 10-11 hours/night and teenagers 9.25 hours/night⁹⁹.

6. Computers/IT

Providing inexpensive and easy access options to contact with course givers may aid families to stay involved in a weight-management program, and give the required support to maintain the behavioral changes that were recommended for success. Technology such as the Internet or e-mail present a selection of potential ways to improve treatment, such as circulating information, supporting suggested self-evaluation procedures, and aiding communication between families and course givers. Availability of a home computer, computer knowledge, interest and free time will influence the impact that these computer approaches will provide in assisting behavioural approach programs for the management of childhood obesity. However, the only research in the young using an Internet intervention for overweight African-American females (age 11-15years) and their families showed only a moderate mean change in weight using behavioral strategies¹⁰⁰ in comparison to other research with African-American females that used a face-to-face behavioral intervention⁹¹. Therefore, additional investigation is necessary in the area.

Current Irish Interventions

FAMILY BASED

Activity, Confidence, Eating (ACE)

The Activity, Confidence and Eating (ACE) programme¹⁰¹ was set up by the HSE-Midland area, due to an increase in obesity levels among children and in turn the increased demand for advice on the management and treatment of obesity. A wide range of health professionals were involved in the creation and development of this programme. Groups of qualified health professionals ranged from the community nutrition and dietetic service, Health Promotion, Community Care Psychology, Public Health Nursing, Area Medical Officers, Community Paediatricians Team and the Department of Public Health and Planning. The main aim of ACE was to research, develop and evaluate a pilot weight management programme for the treatment of obesity in childhood.

Eligibility criteria are children between the ages of 6 and 12 years with BMI above the 91st centile, with no medical cause for overweight or obesity. The dietetic component includes two education sessions with parents, one nutrition activity session with children and an education session with children and parents. The programme ran for twelve weeks and evaluation measures were taken at different stages through the programme implementation at baseline, 3, 6 and 12 months (post intervention). The programme was effective in decreasing BMI in the short term however long term evaluation showed weight and waist circumference increased gradually post intervention. The main strengths of the programme include the clear structure and awareness of parents of what level of commitment are required, individual meetings between parents and professionals, informal delivery and participative nature focussing on a whole family approach. The programme is currently being run in the Longford and Westmeath area. Currently trained physical activity health promotion officers, dietitians and psychologists are running the programme using support materials from the resource folder provided so there is no training provided for health professionals.

Food Dude Healthy Eating Programme'

- By the Irish Food Board

This initiative aims at improving children's long-term consumption of fruits and vegetables by providing free fruits and vegetables at school for 16 days along with videos and rewards based on the 'Food Dude' characters. The programme was carried out from 2005 to 2008¹⁰² in 150 primary schools across Ireland and involved approx 31 000 children. This research was carried out in the home environment with a small group of 5 to 6 year-old children (identified by their parents as 'fussy eaters') who ate little fruit and vegetables. It is a family based initiative as lunches not provided in Irish schools and school based as food consumption is supervised/rewarded by teachers. As well as eating fruit and vegetables at school, it is important that children eat them at home too. Parents can help by encouraging children to eat and enjoy a healthy amount of fruit and vegetables, and set an example by eating them too. It encourages parents to give praise and encouragement every time their child eats fruit and vegetables and not to offer sweet foods as 'rewards' for eating fruit and vegetables. They advise that there is no need to argue about food, just make sure that fruit and vegetables are available for your child and stay positive. The parent can help their child fill out the Food Dudes Home Chart daily, and encourage him/her to try new fruit and vegetables - variety is good for health. The child receives fruit and vegetables containers and the parents can

spend time together choosing interesting ways to fill them, to contribute towards a healthy packed lunch.

Little Steps go a Long way-

By HSE, Safefood and the Health Promotion Agency in Northern Ireland⁵⁸

Entitled, 'Little Steps Go A Long Way', the campaign is a major awareness initiative involving television, radio advertising and digital activity designed to empower people, by showing that small changes to physical activity and food habits will have a big impact on health and on the levels of people who are either overweight, or obese.

Healthy Food for All

This initiative has been developed due to the increasing awareness of food poverty among low-income families. Food poverty has many consequences for health, education and social participation⁴⁸. The goal of this intervention is to support local projects, which “promote availability and access to healthy and affordable food for low-income groups”. It centres on community food schemes and direct food provision including school dinners. Its aim is to develop an all-Ireland education system to identify best practice on endorsing healthy food for low-income families and to expand contacts with comparable organisations in the UK and Europe, to support awareness of food poverty, with attention on food cost and accessibility.

Children’s Advertising Code

Ireland has introduced a ‘Children’s Advertising Code’ applying health warning messages to the advertising of fast food, confectionery and soft drinks.

The Broadcasting Commission developed a broadcasting advertising code specifically for children's advertising. This code covers advertising which are likely to be of direct or indirect interest to children. The code specifies standards to be complied with and rules and practices to be observed.

The code was developed using a three phased public consultation which ran over 18 months. The Commission took into account submissions received from members of the public, children, broadcasters, advertisers, health bodies and government bodies.

The code became fully operational on January 1st 2005 and replaces Section 14 of the Codes of Standards, Practices and prohibitions and Other Forms of Commercial Promotion in Broadcasting Services. It applies to all Irish broadcasting services.

Foods for Kids' Menus Launched by Irish Hotels

The scheme, which supports more options for parents, is the first nationally coordinated campaign of its kind in Europe. The IHF will recommend to chefs healthy preparation guidelines as well as a variety of nutritious 'Family Friendly Menus' seasonally augmented in line with the availability of fresh foods. In joint venture with independent dietitian Margot Brennan, the scheme will see the introduction of a complete choice of menu options across participating hotels and guesthouses from May 2008 onwards.

EU Approaches

EU Platform on Diet, Physical Activity and Health

In response to the dramatic increase of obesity across Europe, in March 2005 the EU Commission launched the EU Platform on Diet, Physical Activity and Health¹⁰³.

All Platform members have agreed to dedicate a rising amount of resources and endeavors either to expand existing initiatives or launching new measures designed to quash the obesity trend. The five areas for action identified so far by the Platform members are:

- Consumer information, including labelling
- Education
- Physical activity promotion
- Marketing and advertising
- Composition of foods, availability of healthy food options, portion sizes

Nestle

In 1992, Nestle began work as an active partner with the French government in a pilot project to educate children and parents in food, nutrition, the role of physical activity in health, and natural body development through childhood and adolescence. This reference study in preventing childhood obesity, called EPODE¹⁰⁴ (Let's work together to prevent obesity in children) was initiated in two towns in Northern France, Fleurbaix and Laventie.

In 2000, the project was extended to involve other stakeholders in the communities as partners: health professionals, caterers, companies, shops and supermarkets, media and others, in addition to schools. By 2004, results even exceeded

expectations, with juvenile obesity in the two towns receiving this education having fallen to only 9% compared to 18% in similar towns in the region not receiving it. EPODE works by moving away from the vision of obesity at the level of the individual and seeing it as a social challenge, providing family-centric solutions through the coordinated actions of all stakeholders concerned. This is a long-term programme within the frame of real daily life. It provides a concrete “step-by-step” apprenticeship for the whole family, based on experience and repetition of key messages based on scientific recommendations. The aim is to get results by positively influencing lifestyle, with no stigmatisation of obesity or of any particular food.

Every quarter, a different category of foods is highlighted, vegetables for example, so during the quarter all stakeholders give out health and nutrition messages on vegetables at the same time: health news pamphlets in doctors’ surgeries, “taste of the season” brochures for parents, teaching animations in schools, ads on billboards and in newspapers, adapted meals and “fun” animations in restaurants and school canteens, and information leaflets distributed by shops, supermarkets and local producers.

In view of the success in the two pilot towns, EPODE is being extended to 50 towns and cities in France, as well as to Belgium, Spain, Greece and Poland, and an initiative has been submitted at an EU level for a pan-European rollout. As in the whole project to date, the pan-European initiative will not be financed from public funds, but from private organisations including the food industry, preventive health companies and health insurance companies. Nestlé has been in EPODE from the start and will continue to play its part in this exciting venture that is now bearing fruit for this and future generations in correcting one of the most dangerous epidemics for children the world has ever known – obesity. Education at all ages on food and lifestyle plays a major role in preventing or controlling obesity and its complications. But it is critical for children to get the right information at the right time.

BBC Worldwide developed a new food policy relating to their licences for children’s food and products to promote healthy food choices. Within this approach, some popular children television characters from programmes being controlled by BBC Worldwide, such as Teletubbies, Tweenies, etc., will be used for marketing of nutritionally balanced food. BBC Worldwide decided to review its food licensing policy in light of concerns over child obesity and nutritional balance in children's diets. Since 2003, BBC Worldwide has been at the forefront of policy development in this area, working extensively with the Food Standards Agency and introducing a new policy under which BBC Worldwide has committed not to license its children's properties for everyday treat foods like cakes and confectionery; not to promote its properties with

fast food companies; to develop with its licensees a range of nutritionally balanced foods; and to lower maximum levels for salt, sugar and fats in line with FSA recommendations. In addition, BBC Children's Magazines will only accept advertisements and commercial promotions that are consistent with the company's food licensing policy.

Mind, Exercise, Nutrition... Do It!! (MEND) - UK

MEND's mission is to enable a significant, measurable and sustainable reduction in global childhood overweight and obesity levels. They provide evidence-based, family-oriented programmes to prevent and treat obesity, and train frontline staff in obesity management to build local capacity and skills. Working in partnership with the private, public and voluntary sectors, MEND blends private sector efficiency with voluntary sector heart and passion to deliver a critically needed social good. By combining practical, fun learning about healthy eating with behaviour modification techniques to boost self-confidence, and fun games that stimulate active enjoyment of physical activity, MEND empowers families to build a foundation for healthy living¹⁰⁵.

Kids Exercise UK

Kids Exercise¹⁰⁶ was formed to offer a unique reference point for keeping kids fit, active and healthy. Keeping your kids active and fit can be hard work. On the website there are tips and advice regarding exercise and nutrition ideas. Features and articles are written by professional journalists and experts - who have a particular interest or a background in this area.

Community Food and Health - Scotland

Community Food and Health (Scotland)¹⁰⁷ aims to ensure that each person in Scotland has the "opportunity, ability and confidence to access a healthy and acceptable diet for themselves, their families and their communities". They achieve this by learning from local neighbourhoods and deliver it by supporting and facilitating communities and policy producers. They are funded by the Scottish Executive Health Department and assisted by the Steering Group consisting of a variety of group and organizations, which advises on the nature and path of the work.

Novel interventions which may help prevent childhood obesity.

Norway- Maternal leave to promote breastfeeding¹⁰⁸: In Norway, women with paid work outside the home breastfeed more than women at home. Maternal leave has gradually increased in length, and currently lasts for one year with 80% pay, or for 46 weeks with full pay. Working women who are breastfeeding are entitled to a two hour leave daily. Ninety eight percent of women leave hospital maternity wards breastfeeding, 90% are breastfeeding at 3–4months and 75% of women are still breastfeeding at 6 months.

Russia- Federation Growing¹⁰⁹. This scheme involves growing vegetables on rooftops in St Petersburg which contributes significantly to fruit and vegetable supplies for local communities in low-income areas.

Switzerland- Companies give advice to employees about their child's overweight.

United Kingdom- Fighting Fat, Fighting Fit¹¹⁰, a television campaign directed at the whole population: good awareness ratings, but recall of the lifestyle message was poorer among those with lower levels of education and among ethnic minority groups. Participation was low, even among target groups.

United States of America-

We Can! or "Ways to Enhance Children's Activity & Nutrition"

We Can!¹¹¹ is a nationwide education intervention developed by the National Institute of Health (NIH) to help prevent childhood obesity in youth ages 8–13. It consists of courses and activities for parents and families as a principal group for influencing children. The course offers resources for parents, caregivers, and children to promote healthy eating, increase physical activity, and decrease television watching. *We Can!* provides evidence-based information and ways to prevent overweight and obesity with guidelines and information for families to eat healthier, get more exercise, and spend a lesser amount of time watching television. It is not a weight loss intervention, but educational programs to aid families choose a more healthful way of life.

BAM! Body and Mind

BAM! Body and Mind¹¹² is an Internet destination for children created by the Centre for Disease Control and Prevention (CDC). It is intended for children 9-13 years old. BAM! Body and Mind provides information that help children to choose options which can result in healthier lifestyles. Themes are directed at what children felt were important including stress and physical fitness which is presented using child-friendly language and uses games, quizzes, and other interactive activities.

Spot the Block– USA

Spot the Block¹¹⁴ was developed by the USA Food and Drug Administration (FDA) "The Block" refers to the nutrition facts label on food packages. The aim of Spot the Block is to urge tweens (9-13 years) to look for the Nutrition Facts Label on the food package and to encourage them to read and think about the Nutrition Facts ("food facts") before making food choices. This programme aims to reach tweens in an effective and engaging way and the FDA is partnering with Time Warner's Cartoon Network to promote Spot the Block to tween audiences.

The FDA/Cartoon Network initiative includes:

- The following on-air spots running on Cartoon Network:
 - Spot the Block! Yo!
 - Serving Size! Yo!
 - A customized Web sitelet housed on Cartoon Network, featuring the animated spots along with interactive nutrition messages and a nutrition label game

I Am Moving, I Am Learning - USA

This programme was developed by the US Department of Health and Human Services¹¹⁵. The Region III Office of the Administration for Children & Families initiated a pilot project in 2005 designed to prevent and reverse the negative consequences of obesity in children. The original pilot project focused on seventeen Head Start programs in Virginia and West Virginia, where the rate of obesity in elementary school children nearly doubled the national average. The project was expanded in 2006.

I AmMoving, I Am Learning introduces multidisciplinary teams from local Head Start

programs to the science of obesity prevention, and provides resources and best practices for addressing the growing child obesity epidemic in an intentional and purposeful manner. Participating Head Start staff attend a two and a half day intensive training program, with follow-up support provided by the Region III Head Start Technical Assistance System.

The overarching goals of I Am Moving, I Am Learning are to:

- Increase the quantity of time spent in moderate to vigorous physical activity (MVPA) during the daily routine to meet national guidelines for physical activity;
- Improve the quality of structured movement experiences intentionally facilitated by teachers and adults;
- Improve healthy nutrition choices for children every day.

Fit for Kids- US

This programme was developed by the Department of Health and Human Services and the Agency for Healthcare Research and Quality (AHRQ) and Discovery Networks, U.S¹¹⁵.

Fit for Kids is a fun, interactive DVD targeted to children ages 5-9 and their families. The DVD offers suggestions to:

- Try to eat five fruits and vegetables a day.
- Get away from the TV and computer screens and move around.
- Find fun ways to be physically active inside and outside.

There is a separate section for parents on small, achievable steps they can take to encourage these healthy habits in their children and themselves.

Bright Futures- US

Bright Futures¹¹⁶ is a national initiative to address the current and emerging health promotion and prevention needs of infants, children, and adolescents. The new edition of the guidelines includes “Promoting Healthy Weight” and “Promoting Healthy Nutrition” as core areas of focus.

Body Works: A Toolkit for Healthy Girls and Strong Women-US

This programme was developed by the Office of the Secretary, Office of Public Health and Science, Office on Women's Health (OS/OPHS/OWH)¹¹⁶.

Body Works is a program designed to help parents and caregivers of young adolescent girls (ages 9 to 13, also referred to as "tweens") improve family eating and activity habits. The program focuses on parents as role models and provides them with hands-on tools to make small, specific behaviour changes to prevent obesity and help maintain a healthy weight. It uses a train-the-trainer model to distribute the Body Works Toolkit through community-based organizations, state health agencies, non-profit organizations, health clinics, hospitals and health care systems.

An Employer Toolkit: Reducing Child & Adolescent Obesity — Addressing Healthy Weight For Employees and Their Children- US. This programme was developed by the Health Resources and Services Administration (HRSA) and the National Business Group on Health¹¹⁷

The National Business Group on Health — with the support of the Maternal and Child Health Bureau — has produced an informative and useful resource entitled Employer Toolkit: Reducing Child & Adolescent Obesity — Addressing Healthy Weight For Employees and Their Children. This toolkit provides large employers with pertinent and timely information, practical strategies and comprehensive analysis of the childhood obesity epidemic in terms of health consequences and costs. This toolkit provides strategies and solutions for employers and parents that speak to the problem of healthy weight management.

Group-Based, Culturally Sensitive Weight-Loss Program for Families Leads to Improvements in Children's Health-Related Behaviors and Declines in Body Mass Index- US

This programme was developed by the Agency for Healthcare Research and Quality (AHRQ)¹¹⁸.

The Promoting Health in Teens and Kids weight management program offers culturally sensitive group education intervention for obese children and their parents that address behavioural changes related to physical activity and nutrition, along with families' economic challenges that might make weight management difficult for children.

Get set for life – habits for healthy kids- Australia

The Get Set 4 Life¹¹³ – habits for healthy kids guide is to be provided to parents/carers as part of the Healthy Kids Check for all Australian children at four years of age.

The Get Set 4 Life – habits for healthy kids guide was developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) for the Australian Government. The Guide provides practical information on key areas of health and development such as: healthy eating, regular exercise, speech and language, oral health, skin and sun protection, hygiene and sleep patterns.

Parents will be provided with a Healthy Habits for Life Guide, which will provide practical, accessible tips on their child's health and development at a critical stage of their young lives.

Conclusions/ Recommendations

RECOMMENDATIONS

Family Based Prevention of Childhood Obesity

National Government

- Build up a continuous and consistent community education movement to increase parents' and children's understanding of the importance of a healthful way of life
- Integrate nutrition, physical activity and obesity prevention objectives into relevant policies and programmes
- Ensure the participation of child health professionals in national policy formulation
- Develop obesity prevention guidelines and best practice case studies for policy implementation
- Taxes on unhealthy food for the endorsement of healthy, nutritious foods
- Restrictions on conflicting health claims
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Food supply

- Increase ability if low income populations to buy food that are rich in micronutrients but low in fat and sugar

- Reduce dependence on sugary soft drinks by e.g. providing a safe, palatable and affordable water supply for all
- Improve dietary quality of universal food supply e.g. in catering outlets
- Appropriate food labelling
- Provision of healthier food choices (i.e. Fruit and vegetables).
- Policies on school lunches
- Removal of unhealthy foods and drinks from vending machines in education facilities and the provision of healthier food choices (i.e. fruit and vegetables).
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Media

- Limitations or removal of advertising of unhealthy commodities to children
- Minimizing advertising of energy-dense, nutrient deprived foods high in fat, sugar and salt from 06:00 – 21:00 hours
- Evaluation of food industry incentives on marketing approaches should also be implemented.
-

Healthcare services

- Improve maternal nutrition
- Breastfeeding support measures need to be strengthened and parents require education and support to optimise infant feeding practices. Regular plotting of measurements on growth charts will enable early detection of postnatal catch-up growth Antenatal education programs and parent support during infancy and early childhood
- If screening for childhood obesity is to be carried out efforts to prevent stigmatisation could include that the measurements be done in a private area and only the child's guardian will have access to the results only via a written request.
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Communities/Homes

- Financial support for exercise amenities
- Safeguarding of open built-up areas
- Creation of safer pedestrian and recreational areas
- Provision of more cycling lanes and pathways
- Design secure play facilities and safe local neighbourhoods
- Healthy eating and active living community development programmes
- Ensure that sports, recreational, leisure, and play facilities are available accessible and equitable to all members of the public
- Minority groups should be incorporated in population-based prevention for example pre-school children

- At least 60 minutes of regular, moderate- to vigorous-intensity each day
Support from schools i.e. making sure the school is committed to healthful lifestyles and enforces policies on diet and exercise

Family Based Treatment of Childhood Obesity:

- Limiting the consumption of foods that are
 - o High in fat
 - o Simple sugars
- Substituting with:
 - o Lower energy,
 - o High fibre foods (example fruits, vegetables and whole-grains)
- Consuming smaller amounts
- Instituting a regular mealtime and snack routine
- High sugar containing drinks, as well as soft drinks and fruit drinks, should be restricted
- Choosing healthier foods when eating in restaurants
- Child should participate in meal planning
- Family should consume regular meals in an agreeable setting
- Family activity should be pleasurable and be suitable for all the family
- Encouragement and help from the child's family, peers, exercise educators
- Increasing physical activity and decreasing sedentary activities
- Given appropriate literature, with regular evaluation and observation
- Behavioural therapy is effective over a one-year period
- Decreasing children's television watching
- Support of parents to educate their children on healthy eating and the influence of advertisements
- More information should be given to parents etc. on childhood obesity to combat negative parental beliefs
- Consuming breakfast

Further Research

There is a call for well-designed research that investigates a variety of prevention interventions¹⁵ with further investigations into the gene-environment relationships²⁰. Gene-environment interactions are very intricate and are poorly understood. Development in this area is likely to be vital for successful obesity prevention²⁰.

Further research may embrace culture specific and ethical factors and take into account socio-economic characteristics of the target population.

Research is still needed on:

- The best measure to use to assess childhood overweight
- Low GI diets, reduced-glycemic load diet
- Achieving behavioural change in families
- The relationship between environmental factors in the family and obesity prevalence
- Using larger ranges of behaviour change
- Further studies could look at the effectiveness of family participation, type of parent involvement, and the amount of parental involvement- is more parental involvement better?
- Motivational interviewing, family therapy and problem solving
- Computers/IT involvement in weight management programs
- If family-based interventions can work better or be useful for a more diverse range of families, if researchers can progress from a “one size fits all” approach to one that includes different ways of family functioning
- How parental beliefs effect a child’s weight
- Sleep deprivation

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