

Master of Nutrition & Dietetics

Short Essay:

Childhood & Adolescence
Overweight & Obesity

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Introduction

Childhood and adolescence overweight and obesity is increasing to epidemic proportions approximately world-wide, and is largely influenced by psychosocial and environmental factors predisposing excessive energy intakes and reduced energy expenditure (in particular), in recent decades as compared with previous. There are significant acute and chronic adulthood psychosocial and physiological health consequences associated with childhood and adolescent obesity, warranting public health initiatives to prevent further increases in its prevalence.

Definition, Measurement & Prevalence Estimates

Obesity is a condition of measured excess adipose tissue associated with adverse health outcomes (Pi-Sunyer 2000; Troiano & Flegal 1998). An International Obesity Task Force workshop (Bellizzi & Dietz 1999) and the NHMRC of Australia (1997) have recommended the use of BMI (kg/m²)-for-age reference centiles as the most simple and reasonable classification of childhood and adolescence overweight or obesity. Various other criteria have been applied -- +2SD or more than standardised weight-for-height values (as previously recommended by WHO in 1998), 120 % of ideal weight and triceps skin folds -- resulting in substantial discrepancy and incomparability of prevalence estimates (NHMRC 1997).

Experts on childhood obesity have consistently sought an internationally acceptable consensus measurement criteria and definition (Bellizzi & Dietz 1999). In response, Cole and colleagues (2000) have developed and published reference charts based on population data from six different countries. As previously recommended (Dietz & Bellizzi 1999), these values were statistically extrapolated from the widely accepted adult cut-off points of a BMI of 25 for overweight, and of 30 for obesity. Applying these reference curves to Australian data, the extent of overweight or obesity in children and adolescents is estimated as approximately 19 to 23 % (Booth et al *in press*, cited by Baur 2001), representing a significant increase during the 10-year period between the 1985 and 1995 national surveys (Magarey & Daniels 2000, cited by Baur 2001). These Australian data are approximately consistent with worldwide trends (WHO 1998) of increasing obesity to epidemic proportions in the US (Troiano & Flegal 1998), some Western Europe countries (Grivetti 2001), and increasingly in lower-income and transitional countries, (Popkin & Doak 1998).

Aetiological Factors

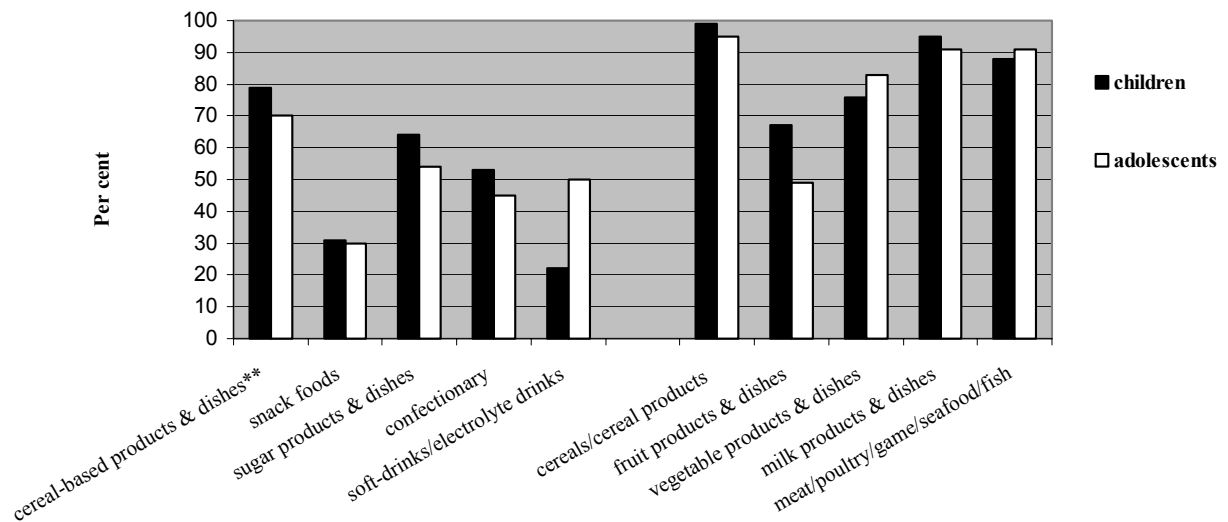
Causative Factors: Energy Intake & Physical Activity

Obesity results from an imbalance in energy intake as compared with expenditure, with one or both of diet or physical activities therefore being major proximate determinants (Popkin & Doak 1998). Over-consumption of energy-dense and high fat, palatable foods with weak satiety value is considered a predisposing factor to obesity (Birch & Fischer 1998; NHMRC 1997). Over 1/4 of Australian children and adolescents reported consuming high sugar/fat meals and snacks (such as pastries, cakes, sweet biscuits, confectionary, high-fat fast food, ice-cream and soft-drinks, Figure 1), in total representing on average ~1/3 of their fat intake and ~1/4 of their energy intake (ABS 1997, 1998 & 1999). This intake is in direct contravention to the Dietary Guidelines and The Australian Guide to Healthy Eating, and may be a contributing factor to the displacement of healthy meals and snacks based on nutritious cereal products, vegetables and fruit in particular (ABS 1997; Cashel 2000; NHMRC 1995). However, the most recent national estimations of mean fat intake (33% of energy consumption) approximate the national dietary guidelines recommendations (30-35% dependent on age) and have remained relatively unchanged, if not slightly decreased, over a ten year period (ABS 1997; DCSH 1985, cited by Gracey 2000 & NHMRC 1995). This suggests that increasing obesity rates may be more related to a reduction in amount and frequency of incidental and planned physical activity, than to an increase in caloric (and particularly fat) intake (NHMRC 1997; Seidell 1999; WHO 1998). Certainly, various sources indicate that up to a quarter of Australian children are not physically active (Booth 2000).

Influential factors: Genetics & Environmental/Psychosocial

Several lines of evidence (including twin, family, adoption & population studies) suggest obesity has a strong polygenetic component, estimated as 30--50% (NHMRC 1997; Perusse & Bouchard 1999). However, whilst obesity has increased over the last decades the gene pool has remained stable, indicating that (normal) genetic factors predispose excessive weight gain given an adverse environment (NHMRC 1997; WHO 1998). Although predisposing genetic factors are currently unmodifiable, there are many potentially modifiable environmental and psychosocial factors that influence obesity (Table 1). In particular, obesity is highly correlated with psychosocial factors of socioeconomic status, educational level and ethnicity with more

Figure 1: Percentage of Australian children & adolescents consuming items from selected food groups* (Adapted from ABS 1999)



*Food item descriptions as per ABS 1999, Appendix 2

**Includes sweet biscuits, cakes, buns, cake-type deserts, pastries & batter-based products

Children include ages 2-11; adolescents include ages 12-18.

Table 1: Selected barriers to childhood & adolescent "healthy" choices: modern socio-environmental factors influencing obesity by mediating energy intake & energy expenditure. (Adapted from Nestle & Jacobson 2000; NHMRC 2000; WHO 1998)

	Probable increased energy intake through:	Probable decreased energy expenditure through:
Industrialisation: technology & economic considerations	<ul style="list-style-type: none"> Increasingly accessible & diverse, highly marketed 'fast' food -- convenience, pre-packaged & take-away, and value-added, upsized options. Increased child & adolescent financial independence allowing greater influence of food preference on food choice; Increased parental financial stress, working hours and breakdown of nuclear families, favouring convenience and solitary, sedentary behaviours, with greater child & adolescent self-reliance and behaviour regulation. 	<ul style="list-style-type: none"> Labour saving devices (including automobiles). Increasingly accessible & diverse array of sedentary entertainment options (television, video & computer games). Household heating & air-conditioning encouraging sedentary indoor pursuits for comfort.
School-based Issues	<ul style="list-style-type: none"> Convenience foods & unhealthy snack foods sold at school canteens & vending machines located within school buildings. Greater freedom of secondary students to leave school at lunch to purchase take-away food. 	<ul style="list-style-type: none"> Decline in funding, & competition with academic priorities, leading to non-compulsory physical education in many. Selling of school land to cover equipment costs & safety issues both reducing space & equipment for creative play.
Community environment issues	<ul style="list-style-type: none"> Confectionary & soft-drink vending machines at undesirable locations (sports & recreation centres, shopping complexes, cinemas) Increasing infiltration of fast-food outlets throughout suburbia; many adolescents work at these. 	<ul style="list-style-type: none"> Suburbia increasingly structured for convenience of automobile drivers, & without shops, schools, entertainment or other destinations within realistic walking/bike riding distance. Increasing parental child safety concerns decreases opportunities for out-door physical activity.

disadvantaged groups more likely to have a higher prevalence of obesity (Grivetti 2001; NHMRC 1997). Body image distortion, associated with chronic dieting, is common for obese older children and adolescents, and particularly for females, who endure significant pressure to conform to the prevalent thin ideal (Grivetti 2001; Williams & Germov 1999).

The influence of TV viewing and food advertising on obesity in childhood and adolescence

The average adolescent watches over 20 hours of television per week and younger children watch more (Pate et al 1994, cited by NHMRC 1997). Numerous epidemiological studies and a randomised controlled trial have determined a statistically significant, positive and dose-dependent association between four or more hours per day of television viewing and child and adolescent adiposity (Crespo et al 2001; Gortmaker et al 1996; Robinson 1999). The two primary mechanisms proposed are: reduced energy expenditure from displacement of physical activity, and increased dietary energy intake, either during viewing or in response to food advertising (Bar-on et al 2001; Robinson 1998).

Australia has one of the highest levels in the world of food advertising during children's television times, accounting on average for between 25% and 40% of all advertisements, and as high as between 76% and 89% on specific days and channels (Hill & Radimer 1997; Morton 1996; PHAA 1999). Most advertisements in children's viewing time promote fast food restaurants, sweetened breakfast cereals, confectionary and soft drinks; items that are mostly high in fat, sugar and salt, and low in overall nutritional value and fibre (Hill & Radimer, 1997; PHAA 1999; Robinson 1998). A valid association between television watching and consumption of these "unhealthy" foods has been demonstrated (Robinson 1998; PHAA 1999; Morton 1996) and these foods made a significant contribution to energy intake as assessed by the 1995 Australian National Nutrition Survey (ABS 1998).

Part of the attraction for these foods result from advertising and marketing strategies employed -- products are promoted as fun and exciting by slim and popular role models, and entice children with premium offers (give-aways and prizes) that have special status amongst their peers. Such marketing directly contravenes the Australian Broadcasting Authority standard, requiring that "any reference to a premium offer should be incidental to the main product being advertised", yet advertising and food industries argue that watching a commercial promoting an "unhealthy" product does not necessarily mean that the child will eventually consume the product (Goldberg 1978, cited by Rossner 1998; Hill & Radimer 1997; PHAA 1999). Certainly parental attitudes and purchase habits are also important considerations, however there is no doubt that children exert significant second-hand buying and children who watch more television commercials also tend to make more purchase requests (Stoneman & Brody 1982, cited by Rossner 1998; Taras et al 1989, cited by Morton et al 1999).

Many critics consider that the regulations are not vigorously applied to food advertising and it is largely self-regulated by the advertising industry, (Morton 1996, cited by PHAA 1999). Consequently, the government have a responsibility to provide the policy framework to prevent the commercial exploitation of children's food preference by ensuring that a quota of healthy food advertisements and messages are screened, and that processed food advertisements are more tightly regulated with respect to information, messages and appeals, and frequency of screening (Morton 1996). Schools can play a significant role in advertising awareness (Robinson 1999) and media education programs have been successfully included in the school curricula in the United States (Kubey & Baker 1999, cited by Bar-on et al 2001). Such programs can be enhanced by supportive school canteen policies that aim to make healthy choices, easy choices.

Health Consequences of Obesity

There is evidence that obesity at critical periods of time (infancy and adolescence, and possibly adiposity rebound between five and seven years of age), appears to increase the risk of persistent obesity into adulthood, itself with increased risk for diabetes mellitus, cardiovascular disease, and many other chronic diseases (Braddon et al 1986, cited by Hill & Trowbridge 1998; Dietz 1998; Law 2000). Chronic disease risk factors such as hyperlipidemia, development of arterial fatty streaks, hypertension and abnormal glucose tolerance occur with increased frequency in obese children and adolescents (Dietz 1998; McGill et al, 2000) and correspondingly, diseases previously thought to be adult on-set (hypertension, dyslipidemia, and noninsulin-dependent diabetes mellitus) are now seen in the most obese children and adolescents (Hill & Trowbridge 1998). However, sleep apnea, pseudotumor cerebri, Blount's disease, and various hepatic, gastric and orthopaedic complications still represent the major sources of physiological morbidity (Dietz 1998; Power et al 1997; WHO, 1998).

Psychosocial problems involving discrimination and prejudice by adults and peers, low self-esteem, body shape dissatisfaction and psychological propensity for the development of eating disorders are the most prevalent form of acute morbidity associated with childhood and adolescent obesity (Dietz 1998; Hill & Trowbridge 1998; WHO 1998). Social achievement and performance in early adulthood is severely impaired by prior obesity, considered as the worst socioeconomic handicap that women who were obese adolescents can suffer (Gortmaker et al 1993, cited by Dietz 1998).

Current Approaches & Strategies for prevention of childhood and adolescence obesity

The current Australian 8-point strategic plan concentrates efforts on reducing the current level of overweight and obesity, preventing further increases in prevalence and ensuring the healthy growth of children (NHMRC 1997). Strategies endeavoured must naturally address both decreasing dietary energy intake and increasing energy expenditure through physical activity. These must act at the macro-environmental level, given the numerous financial and other barriers to individual capacity (Table 1), and previous failures to elicit behavioural life-style change by individually targeted educational strategies (Nestle & Jacobson, 2000; NHMRC 1997). The regular monitoring of food consumption, exercise levels and obesity (with a consistent, agreed upon measure desperately needed for each) will be an important evaluation tool to assess the success of the strategic plan, (NHMRC, 1997).

Table 2: Reducing the prevalence of obesity: selected environmental strategies
(Adapted from Nestel & Jacobson, 2000; NHMRC, 1997; WHO 1998)

Area for action	Selected example strategies
School curricula	<ul style="list-style-type: none"> - Require instruction in food skills/ nutrition (using The Australia Guide to Healthy Eating (CDHF, 1998) as a key resource) & media education regarding fast food and snack food marketing. - Require & fund daily physical education/ sports programs in primary & secondary schools, emphasising non-competitive, moderate intensity physical education as sustainable into adulthood. - Provide adequate sport & activity areas, facilities & equipment for above
Food service standards	<ul style="list-style-type: none"> - Protect school/childcare food programs by eliminating the sale or provision of soft drinks, confectionary & foods high in calories, fat, or sugar & providing healthy alternatives, with nutrition standards & guidelines in keeping with recommendations by The Dietary Guidelines for Children and Adolescents and The Australian Guide to Healthy Eating.
Laws & Regulations	<ul style="list-style-type: none"> - Require chain restaurants, movie theatres & similar, to provide information about calorie, fat & sugar content on menus or menu boards and nutrition labelling on wrappers. - Require print advertisements to disclose the caloric content of the foods being marketed. - Restrict advertising of high-calorie, low-nutrient foods on television shows commonly watched by children or require broadcasters to provide equal time for messages promoting healthy eating & physical activity.
Taxes & Economic Incentives	<ul style="list-style-type: none"> - Introduce subsidies for producers of low energy-dense foods (particularly fresh produce). - Provide additional welfare assistance for low-income families, perhaps with a discount on purchase of healthy fresh & unprocessed produce (fruits, vegetables, cereals). - Levy (<i>small and realistic</i>) taxes on soft-drinks & other foods high in calories, fat, or sugar to fund campaigns to promote good nutrition & physical activity. - Remove sales taxes on, or provide other incentives for, purchase of exercise & sports equipment with further discounts particularly for public schools.
Urban Design & Transportation Policies	<ul style="list-style-type: none"> - Provide funding & other incentives for developing and use of safe bicycle paths, recreation centres, swimming pools, parks and play-grounds, and foot-paths, consecutively addressing community & parental safety concerns. - Develop and provide guides for "building health cities" including for urban planners to create pedestrian malls, automobile-free zones, and modify residential neighbourhoods, schools, shopping centres & other buildings to promote physical activity.
Promotion & Education	<ul style="list-style-type: none"> - Improve & further develop mass media and on site (where food is purchased) health promotion campaigns that emphasise benefits of healthful eating and physical activity patterns, as meaningful & appealing to younger children & adolescents.

Key influential locations for action are evidently childcare centres, kindergartens, schools, hospitals (and other relevant institutions), community groups and the urban environment (Baranowski et al, 2000; NHMRC, 1997). Additionally, although overlooked by the Australian strategic plan, strategies aimed at families (including aspects of improving income and knowledge) are important given their influence on food availability, preference and choice, and level of physical activity (Campbell & Crawford, 2001). Making healthy choices easy choices will require shared multi-sectorial responsibility and action by government (through appropriate law and policy), health professionals, food industry and trade, and media (Nestle & Jacobson, 2000; NHMRC, 1997; WHO 1998), by means as presented in Table 2. Understandably, change at the macro-environmental level is politically and economically difficult to achieve, yet is undeniably justified given the given population cost of obesity (a conservative \$736 million in 1989-90 *alone*) (NHMRC, 1997).

Conclusion

Current Australian data suggests that children and adolescents may consume significant intakes of fat and energy from energy-dense, low nutrient-density food sources, with a significant proportion also being physically inactive. Multiple psychosocial and environmental factors influence these behaviours including television viewing, as extensively discussed. Given that early-formed dietary and activity habits (and obesity itself) persist thereafter into adulthood (with risk for associated chronic disease and other significant health consequences), it is necessary to target obesity prevention strategies for youth. The government has significant responsibility to ensure policy supportive of the NHMRC Strategic Plan in order to create a macro-environment where healthy choices are easy choices, with schools a particularly important site for public health action to reduce the prevalence of obesity.

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