

Building solutions for preventing childhood obesity

Overview Module



Building Solutions for Preventing Childhood Obesity

Overview Module

Prepared on behalf of the Prevention Research Centres:
NSW Centre for Overweight and Obesity
NSW Centre for Physical Activity & Health
NSW Centre for Public Health Nutrition

January 2008

This is one of a set of modules in the series *Building solutions for preventing childhood obesity*.

Other modules are:

[Overview module](#)

[Module 1](#): Interventions to promote consumption of water and reduce consumption of sugary drinks

[Module 2](#): Interventions to increase consumption of fruit and vegetables in children

[Module 3](#): Interventions to reduce consumption of energy-dense, nutrient-poor foods

[Module 4](#): Interventions to promote eating breakfast

[Module 5](#): Interventions to increase physical activity in children 5 - 12 years

[Module 6](#): Interventions to increase physical activity in adolescents

[Module 7](#): Interventions to reduce sedentary behaviours

ISBN: 978-1-921186-05-9

Suggested citation:

King L, Hector D. Building solutions for preventing childhood obesity. Overview module. NSW Centre for Overweight and Obesity. Sydney: 2008.

Acknowledgements:

This series of reports has been a team effort. Thanks to Josephine Chau, Louise Farrell, Libby Hattersley, Lou Hardy, Debra Hector, Lesley King, Philayrath Phongsavan, Vanessa Shrewsbury, Siranda Torvaldsen and Adeline Yaw.

The NSW Centre for Overweight and Obesity, the NSW Centre for Physical Activity & Health and the NSW Centre for Public Health Nutrition are funded by the NSW Department of Health and supported by The University of Sydney.

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1 Introduction

1.1 Context of this report

This report is one of a series presenting a synthesis of recent evidence on the effectiveness of interventions to prevent weight gain and promote healthy weight in children and adolescents. This series of reports is designed to update the approaches for children and families that were presented in the Centre for Public Health Nutrition (CPHN) report '*Best options for promoting healthy weight*'¹.

These reports on *Building solutions for preventing childhood obesity*, have been presented as a series of modules on behaviours associated with the development of overweight and obesity, in order to reflect clusters in the evidence base, allow clear comparisons between similar interventions and highlight promising approaches, as well as gaps, in the evidence.

The CPHN report applied a structured planning framework to identify potential interventions to promote healthy weight amongst children and adults. It presented a portfolio of promising strategies within five settings-based action areas, and described a set of enabling actions to support interventions. The approach adopted in the report reflected and reinforced the International Obesity Task Force's 10 key principles for the prevention of obesity at the population level², including the importance of drawing on lessons from other public health efforts. In adopting a broad approach to assessing evidence of effectiveness, and seeking information from a range of study types and sources, the CPHN report identified the best available evidence whilst ensuring that untried or promising strategies were not prematurely excluded.

Academic and policy attention towards the prevention of overweight and obesity in Australia and internationally has gained considerable momentum since the CPHN "Best options" report was published, with significant policy documents released from the United States, United Kingdom, Europe, Australia and the World Health Organization (WHO). In May 2004, the WHO endorsed the '*Global Strategy on Diet, Physical Activity and Health*,' which outlined a range of policy options to address unhealthy diets and physical inactivity, and provided a strong blueprint for obesity prevention³. In 2005, the US Institute of Medicine (IOM) released the report '*Preventing Childhood Obesity: Health in the Balance*' in response to a request from the US Congress for a prevention-oriented action plan⁴. The IOM report was underpinned by a broad and inclusive approach to assessing evidence for effectiveness. Within Australia, a range of prevention strategies have been launched over the last three years in response to new information on levels and trends in childhood overweight and obesity. Within NSW, child obesity prevention has been afforded high level strategic direction in recent years, initiated by the 2002 Childhood Obesity Summit and the development of the state government's action plan '*Prevention of obesity in children and young people: NSW Government Action Plan 2003-2007*'⁵. Obesity prevention has subsequently been identified as a priority in the NSW State Plan⁶. The state government has made a commitment to promoting healthy lifestyles through social marketing and health education campaigns such as "*Live Life Well*" and an increasing range of community-based obesity prevention programs are being implemented or are under development.

As debate continues over the nature and range of evidence required to inform responses to the obesity problem, prevention strategies and policy are being developed based on the best evidence available. In this context it is imperative that new and emerging intervention research is continuously reviewed, in order to best inform policy and practice with the most up-to-date evidence available. This report was therefore initiated to provide an update of the evidence on promising interventions to prevent inappropriate weight gain and obesity in children. It is also intended to address some of the gaps in the existing evidence base and limitations in the way the evidence is assimilated. While there is a slowly accumulating body of intervention evidence, including many reviews, research continues to focus on the determinants of overweight and obesity.

Those reviews of the intervention evidence that have been conducted to-date have largely focused on intervention studies in which some measure of weight was considered as an outcome variable. Therefore, promising interventions which have targeted the various behaviours that influence children's weight status, but which have not assessed weight as an outcome variable, have not been considered. Yet, strategies which effectively change contributing behaviours should be of significant interest, as they have the potential to act as building blocks when applied in combination with strategies addressing other behaviours as part of a comprehensive obesity prevention approach⁷. In addition, evidence reviews to-date have often taken a limited approach by focussing on methodological quality but taking little account of intervention quality, intensity and duration, thus failing to identify promising intervention strategies that warrant further research but which may have been inadequately implemented to-date.

This report takes a solution-oriented approach to identifying and describing the 'best evidence available' for the prevention of child obesity by using a number of innovative approaches, including:

- A broad and inclusive literature search, encompassing systematic reviews, narrative reviews, published intervention studies, the grey literature, and studies of mixed methodological quality.
- Consideration of interventions which have addressed various behavioural determinants of inappropriate weight gain, in addition to those which have directly addressed weight status.
- A multi-staged appraisal process, with substantial attention and rigour given to interpretation of findings, consideration of intervention appropriateness as well as effectiveness, and identification of implications for policy and practice. A similar approach has been applied previously in the identification of best available evidence for purchasing health promotion services in a New Zealand health region⁸.

1.2 Purpose of this report and intended audience

This set of modules is designed to meet the needs of relevant policy-makers, government agencies, area health service workers, non-government and community organizations, and health practitioners, by providing up-to-date and solution-oriented information to guide the development and implementation of child obesity prevention strategies in NSW. It is intended that this report will function as a tool for an integrated, comprehensive approach to addressing child obesity in NSW involving the full range of stakeholder sectors, agencies, organisations, communities and settings.

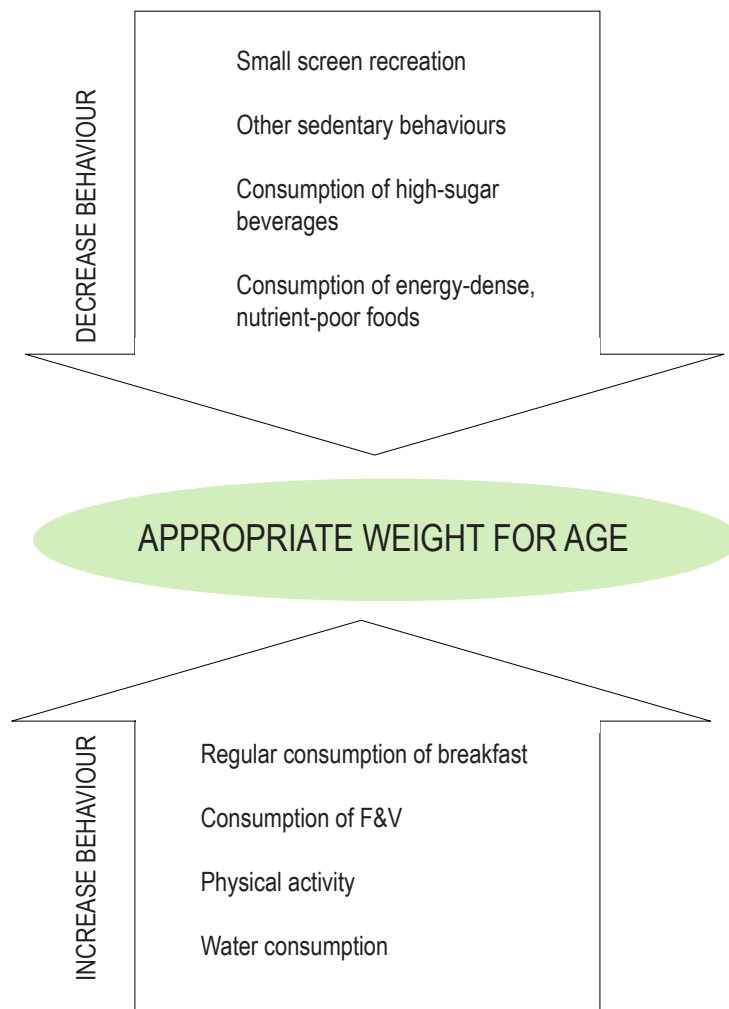
Specific objectives of this report are:

1. To build on the 2005 CPHN report "*Best options for promoting healthy weight and preventing weight gain in NSW*"¹ by providing an update of intervention evidence in a format reflecting the progression of knowledge and understanding in the area of child obesity prevention since publication of that report.
2. To address the gaps in the way the evidence base on preventing child obesity is being assimilated by conducting an inclusive and solution-oriented review of the evidence.
3. To identify promising approaches for addressing the behavioural determinants of inappropriate weight gain and preventing child obesity in NSW, across the full range of settings and sectors.
4. To identify implications for policy and practice and guide the development of a comprehensive and coordinated framework for prevention of child obesity in NSW.

1.3 Organisation and structure of this series of reports

The existing volume of intervention evidence addressing nutrition, physical activity and sedentary behaviours tends to cluster around specific topics with similar aims and settings, rather than be spread across all contributing factors or intervention settings. This 'clustering' of the evidence base around specific behavioural intervention points for the prevention of childhood obesity is illustrated in Figure 1. The behaviours outlined can broadly be separated into those that should be encouraged in order to achieve appropriate weight-for-age (e.g. physical activity), and those that should be limited (e.g. sedentary behaviours).

Figure 1. Summary of the behavioural intervention points addressed in the existing evidence base



Note that these key behaviours also reflect major behavioural priorities for promoting healthy weight, based on analyses of epidemiological knowledge and potential for change.

This evidence summary has been designed to best reflect the evidence clusters by being presented as a series of modules, with each module representing a behavioural intervention point for the prevention of inappropriate weight gain and achievement of appropriate weight-for-age in children.

Taking this modular approach has the advantage of highlighting promising approaches and allowing clear comparison of similar interventions aimed at a particular behaviour. It also enables gaps in the existing evidence base to be identified; for, while the evidence base is expanding, the range of interventions conducted to-date remains relatively restricted in terms of target groups and settings. The evidence gaps and the opportunities this poses for future research are discussed within individual modules. Section 3.4 in this module also shows the overall patterns of gaps in intervention research to date.

Behavioural intervention points addressed in the existing evidence base and presented as modules in this report are:

- i. Consumption of water and reduce consumption of sugary drinks
- ii. Consumption of fruit and vegetables
- iii. Consumption of energy-dense, nutrient-poor foods (generally high fat)
- iv. Eating healthy breakfast
- v. Physical activity in children (5 - 12 years)
- vi. Physical activity in adolescents
- vii. Sedentary behaviours

Each module is designed to function as a stand-alone resource in addition to forming a part of the full report. The modules vary in structure and depth according to the available evidence base on each topic. However, each module comprises of a number of general components:

- Overview of background and methodology
- Problem analysis and rationale for intervention
- Table and text summaries of available intervention evidence
- Appraisal of available evidence
- Identification of promising and appropriate strategies
- Discussion of implications for policy and practice in NSW, including a summary table of key setting/sector involvement, and implementation considerations for promising strategies.

Highlighting key setting and sector opportunities within each module reflects the critical influence that settings can have on behaviours. Schools, early childhood services, local government, health services and community organisations have defined structures and provide accessible channels and mechanisms for reaching specific populations⁹. With children spending a considerable amount of their time in schools, and sport and recreation groups, these settings represent significant opportunities for program delivery. At the same time, interventions in these settings are unlikely to be effective if they are not supported by strategies involving parents and families, and promoting a supportive and healthy home environment. The community settings is less defined and poses different challenges, but provides opportunities for reinforcement of more targeted school- and home-based interventions.

1.4 How to use this series of reports

This report is not intended to be a comprehensive review of the evidence; however, in taking the form of a set of modules or 'building blocks', much of the latest evidence relating to prevention of inappropriate weight gain in children has been covered. It generally reviews the most recent intervention evidence while it can therefore be read in conjunction with the earlier 2005 CPHN report "Best options for promoting healthy weight and preventing weight gain in NSW"; however this is not essential.

Portfolio approach

While the individual modules within this report are able to be read as stand-alone resources, it is well-accepted that a portfolio approach to population obesity prevention, involving implementation of multiple complementary interventions and targeting a range of groups, settings and behaviours, is required. Therefore, this report as a whole is designed to act as a 'tool-kit' for stakeholders to select the most appropriate mix of interventions for their area, based on unique local needs, issues and capacities.

Cross-sectoral action

In order to guide implementation, the approaches identified as promising and worthy of consideration within each module have been translated into practical actions and programs that could be implemented in communities and areas within NSW and Australia. The relevant government sectors that could contribute to implementation have also been identified.

2 Methods

2.1. Systematic search and identification of interventions

Broad and inclusive systematic searches were conducted for interventions, programs, and evidence reviews which included at least one of the following as an outcome measure:

- A marker for child overweight or obesity (e.g. weight, BMI, waist circumference, body fat)
- A marker for a risk factor/ behavioural determinant of overweight/obesity (physical activity, nutrition/diet, sedentary behaviours)

Databases and sources searched:

- All at OVID: including CINAHL, EMBASE, PUBMED, and MEDLINE
- EBM reviews databases (Cochrane, Trials Register, DARE, ACP)
- Google
- Australian studies reported in the grey literature

Initial search strategy:

(Intervention OR program) AND (child OR children OR adolescent) AND (nutrition OR diet OR healthy eating)

(Intervention OR program) AND (child OR children OR adolescent) AND (physical activity)

(Intervention OR program) AND (child OR children OR adolescent) AND (sedentary OR inactivity OR television viewing OR small screen recreation)

Inclusion criteria:

- Articles printed in English
- Interventions targeting children aged 0-18years
- Articles published since January, 2007

Exclusion criteria:

- Articles printed in a language other than English
- Articles published prior to 1997
- Interventions targeting adults or young people aged over 18 years

The specific methods used in preparing each module are noted in those module reports.

2.2 Initial appraisal of interventions and organisation into modules

The initial literature search found that the evidence base was clustered around specific behavioural intervention points which formed the basis of individual modules (see section 1.3).

A second search of the literature specific to each module was then conducted, to identify additional interventions not retrieved in the initial search phase. Search criteria used in this second stage are outlined at the beginning of individual modules. Interventions targeting more than one intervention point were considered within each relevant module.

2.3 Critical appraisal and identification of promising approaches

Appraisal of public health intervention evidence should encompass: quality of study methods, validity, applicability and transferability of findings, strength of the evidence, and interpretation of study results¹⁰. Individual interventions were systematically analysed in a two-phase process. Interventions were first critically appraised, based on recommended approaches¹⁰ and the ‘promise table’, (see Table 1)¹¹.

Table 1 Promise Table (Adapted from Gill et al 2005¹, Swinburn et al 2005¹⁰)

Certainty of effectiveness* (Risk)	Potential Population Impact^ (Return)		
	Low	Moderate	High
Quite low	Least Promising	Less Promising	Promising
Medium	Less Promising	Promising	Very Promising
High	Promising	Very Promising	Most Promising

* Confidence from the evidence that the intervention will produce a benefit under ideal conditions

^ Efficacy x (population reach x uptake)

A second level of filtering then considered cultural and organisational relevance and compatibility of promising interventions identified according to the following criteria:

- i. Which (effective) interventions apply best practice health promotion principles?
- ii. Which (effective) interventions are culturally appropriate in the NSW setting?
- iii. Which (effective) interventions are compatible with NSW organisational arrangements and capacity?

On the basis of the above analyses, a set of recommended ‘promising and appropriate’ interventions were determined for each module, under the following categories:

2.3.1 Promising and appropriate strategies based on available evidence

The strategies in this section were determined as particularly promising for application in NSW on the basis of the evidence appraisal, as described above.

2.3.2 Strategies with some promise and worthy of consideration

From the evidence appraisal process for each module, there were a number of strategies that did not qualify as promising, but which may be potentially effective and should not be prematurely excluded. These interventions are those where:

- There was insufficient evidence to determine the level of promise, with only a small number of studies, and small effects or inconsistent results
- Promising approaches that could be adapted to different settings or to fit the Australian context.

2.3.3 Intervention research gaps and priorities for intervention research

It was beyond the scope of this project to list all of the gaps in the evidence surrounding each behaviour. Nevertheless, a small set of priority areas for future intervention research has been identified for each module, with the selection guided by:

- pointers from epidemiological studies on the particular behaviour
- pointers from intervention research on other nutrition and physical activity behaviours.

2.4 Identification of implications for policy and practice

Implications for policy, practice and future research for each module were identified based on specific issues arising through evidence appraisal; and in the context of more generic issues that pertain to program implementation and childhood obesity prevention. In this section of each module, implementation considerations and opportunities for action across key settings and through relevant sectors are examined.

3 Summary of Findings

The recommendations from each module for promising and appropriate strategies, strategies worthy of consideration and priority areas for future interventions research within each behavioural issue or intervention point are listed below.

3.1 Promising strategies based on available evidence

Reducing consumption of sugary drinks and promoting consumption of water

- o Parent and family-focussed education strategies to promote replacement of sugary drinks with water consumption
- o Whole-of-school strategies to promote replacement of sugary drinks with water consumption

Promoting consumption of fruit and vegetables (F&V)

- o Education in schools (in combination with other strategies)
- o Policy to increase F&V availability in schools, e.g. free or subsidised F&V
- o Point-of-purchase prompts at school food sites
- o Pricing strategies in school canteens

Reducing consumption of energy-dense nutrient poor foods (EDNP)

- o Whole-of-school programs involving school food service, school environments, classroom curriculum and family-focused strategies
- o School policy limiting availability of EDNP foods and promoting healthy foods in all school food-outlets
- o Preferential pricing and promotion of low energy-dense foods in all school food-outlets e.g. point-of-sale signposting and verbal promotion
- o School -based nutrition education, including complementary computer-based strategies

Promoting eating of breakfast

No promising approaches were identified

Promoting physical activity in children 5-12 years

- o Modifying school environments with playground markings and equipment
- o Involving the family or community in school health and physical education interventions
- o Providing teachers with professional development and ongoing support to deliver enhanced health and/or physical education
- o Integrating school health and physical education programs with teaching children skills to engage in self-directed physical activity

Promoting physical activity in adolescents

- o Multiple component school interventions which combine curriculum, environment and policy strategies with parental/community involvement
- o Creating school environments, policies and curriculum delivery to address activity needs of girls
- o Modifying school policy and environments to create more opportunities for boys to be physically active
- o Adapting the structure, planning and delivery of lessons to maximize opportunities for physical activity.

Reducing sedentary behaviours

- o School-based programs on sedentary behaviours that combine curriculum, environment and policy strategies with family and community components
- o School-based education on sedentary behaviours in which key messages are integrated into the curriculum

3.2 Strategies Worthy of Consideration

Reducing consumption of sugary drinks and promoting consumption of water

- o Modifying school environments to increase availability of water and reduce availability of sugary drinks
- o Promoting attitude changes to reduce the availability of sugary beverages in the home environment
- o School-based education to promote water and reduce consumption of sugary drinks water

Promoting consumption of fruit and vegetables

- o Gardening activities at school
- o Taste-testing opportunities in schools
- o Education of children and parents together
- o Organisational policy to increase F&V availability in before and after school programs

Reducing consumption of energy dense, nutrient-poor foods (EDNP)

- o Nutrition education in after-school care and preschool settings
- o Community-based nutrition education strategies involving children and parents together, including focus on parenting behaviours and role modelling

Promoting physical activity in children 5-12 years

- o Using mass media social marketing campaigns

Promoting physical activity in adolescents

- o Developing adolescents' skills to be physically active, as a component of whole school strategies
- o Pedometers as a means of encouraging activity, especially with older adolescents
- o Brief counseling with advice and feedback delivered through community or primary health care settings and tailored to meet the specific needs of boys and girls

Reducing sedentary behaviours

- o Restricting access to television in the home
- o Providing feedback, reward and reinforcement for reducing sedentary screen time
- o Community-based interventions on sedentary screen behaviours which include family component
- o Family counselling interventions on sedentary behaviour and screen time

3.3 Gaps and priority areas for intervention research

Specific gaps identified in relation to each evidence module are as follows:

Reducing consumption of sugary drinks and promoting consumption of water

- o Interventions to promote water and reduce consumption of energy-dense drinks specifically targeted towards adolescents
- o Interventions that address availability of sugary drinks in areas surrounding schools and at recreational facilities.

Promoting consumption of fruit and vegetables

- o Interventions to increase F&V availability and accessibility at home and in community settings
- o Interventions to increase F&V in school lunchboxes
- o Interventions aimed to increase vegetable consumption specifically

Reducing consumption of energy-dense nutrient poor foods

- o Interventions to reduce availability and consumption of EDNP foods at home/community
- o Social marketing strategies to promote awareness and reduce appeal of 'extra' and EDNP foods
- o Pricing, availability and point-of-sale interventions in sporting and recreational settings frequented by children
- o Interventions to reduce environmental prompts for EDNP (that is, limit advertising outdoors, sports facilities, supermarkets and retail outlets)

Promoting physical activity in children 5 - 12 years

- o Encouraging active transport (to school and elsewhere) through policy and infrastructure
- o Using rewards to increase children's physical activity
- o Promoting access to and use of open space

Promoting physical activity in adolescents

- o Interventions to increase physical activity by decreasing time spent in sedentary behaviours
- o Community-based interventions to increase adolescents' participation in physical activity during their leisure time, such as organized activities and recreational programs

Reducing sedentary behaviours

- o Interventions to decrease time spent engaging in non-educational computer based activities
- o Web-based programs and e-communication strategies which provide strategies on reducing sedentary behaviour and screen time.
- o Health education initiatives that cover sedentary behaviours targeted to families with pre-school aged children

3.4 Overall intervention research gaps and priorities for research

3.4.1 Intervention research

It is important to note that the research on interventions is highly clustered on particular behaviours and settings (consumption of fruit and vegetables, and schools as the main setting, for example), and does not comprehensively cover the full range of potential intervention points, intervention types, settings or target groups (see Table 2). This is significant, as it means there are substantial gaps in the evidence base – where there may be substantial potential for effective interventions, but where none have been tried.

One important implication of these gaps is that further innovation - designing and evaluating new interventions in these ‘gap’ behaviours, settings and target groups - remains a high priority.

Table 2: Gaps in current intervention evidence relating to childhood obesity prevention

	FOCUS OF CURRENT EVIDENCE BASE	SIGNIFICANT GAPS
Settings	Schools	<ul style="list-style-type: none"> • early childhood services • community sports and recreation clubs, organizations • neighbourhood settings • after school programs • home • shopping centres
Issue/behaviour	<ul style="list-style-type: none"> • fruit and vegetables • moderate to vigorous activity at school • TV viewing 	<ul style="list-style-type: none"> • small screen recreation other than TV • incidental activity • energy-dense foods, including take-away foods • portion size • soft drinks • nutrition in the early years
Type of intervention	<ul style="list-style-type: none"> • education/information • schools programs 	<ul style="list-style-type: none"> • environmental changes, such as transport infrastructure, community facilities, new technological products, zoning of food outlets • policy interventions • social interventions e.g. peer support, buddy systems • mass media • pricing, promotional and incentive systems for food or activities • interventions influencing parenting approaches and skills
Age group	<ul style="list-style-type: none"> • primary school-aged children 	<ul style="list-style-type: none"> • pre-schoolers • adolescents, with a gender specific approach • infants
Social and cultural groups	<ul style="list-style-type: none"> • US studies, including minority groups 	<ul style="list-style-type: none"> • Diverse cultural groups • Aboriginal and Torres Strait Islanders • Rural communities

4. Implications for Policy and Practice

4.1 Implementation considerations

In the majority of potential behavioural intervention points examined, a number of strategies were identified as promising or worthy of consideration for NSW Area Health Services and other public health practitioners to use as part of their work in preventing childhood obesity and promoting healthy weight. Comments on implementation are presented within each module and some of the salient principles for best practice across behaviours comprise:

- Clear, concise and appropriate objectives
- Specific strategies which address the identified objectives
- High quality implementation of specified interventions
- Intervention and follow-up time frames should be of sufficient length to detect positive effects and determine the extent to which these effects are, or are not, maintained over time
- Sufficient sample size and appropriate comparison groups when evaluating interventions
- Use of valid and reliable measurement tools
- Measurement methods and outcome measures that allow determination of possible compensatory effects
- Measure total physical activity of children as well as types of activity in which they take part

As the majority of the interventions discussed in each module were conducted overseas and many were tailored to specific communities and population groups, modifications will be required when translating these approaches to the NSW context. It will be important to conduct thorough expert and stakeholder consultations and pilot testing to ensure that modified approaches are feasible and appropriate for implementation in NSW.

In evaluating interventions, it is important to use valid, reliable and sensitive outcomes measures, as far as possible. This will enhance the opportunity to discern genuine effects when they occur.

4.2 Portfolio approach

It is likely that no single strategy aimed at a single dietary or physical activity practice will prevent weight gain at the population level; and it will be necessary to apply a variety of strategies aimed at a range of behaviours in order to achieve this outcome. Taking multiple and complementary approaches will help to address physical activity and nutrition in a range of domains in children's lives, from different settings to different developmental stages.

Generally, the implementation and effectiveness of programs will be enhanced by supplementary initiatives, such as communication and public education through local media and other channels, and promotion and reinforcement through health professionals' opportunistically providing accurate information and consistent advice.

At the same time, each of the interventions needs to be sufficiently intense to achieve an optimal reach and effect. Significant health gain may be achieved by systematically addressing a target behaviour in a comprehensive fashion across population groups and settings.

Overall, to achieve sufficiently large changes in energy intake and energy expenditure that could affect energy balance at the population level, the public health efforts need to be intense, wide-reaching and sustained over a long period.

4.3 Translating evidence into cross-sector actions

Within each module, approaches identified as promising and worthy of consideration have been interpreted into practical actions and programs that could be implemented in communities and areas. In many cases, implementation of actions would involve a mix of agencies. This is not surprising, as many of the factors that influence eating and physical activity behaviours are influenced by a wide range of human services and infrastructure sectors, and not by the health sector. In fact, the health sector is largely responsible for managing the subsequent health problems; but other sectors influence causal environmental and social factors.

The relevant government sectors that could contribute to implementation have also been identified in each module.

Key sectors that can contribute to policies and programs and noted within modules include:

- o Agriculture
- o Community services
- o Education sector
- o Health
- o Local government
- o Planning
- o Recreation
- o Roads and Transport Authority
- o Transport.

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