INTERVENTIONS ON DIET AND PHYSICAL ACTIVITY: WHAT WORKS

EVIDENCE TABLES

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Interventions on diet and physical activity: what works: evidence tables.

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Introduction

Recognizing the heavy and growing burden of chronic noncommunicable diseases (NCDs), the Global Strategy on Diet, Physical Activity and Health (DPAS) was endorsed by the World Health Assembly in 2004 (*1*). DPAS describes the responsibilities of many stakeholders to take action to improve diet and promote physical activity. One of the responsibilities of the World Health Organization (WHO) is to "*identify and disseminate information on evidence-based interventions, policies and structures* " (*1*). This priority is further underlined in the NCD Action Plan that was endorsed by the World Health Assembly in May 2008.

Interventions on diet and physical activity: what works (*What Works*) addresses this responsibility, and is presented in three independent parts. The first document provides policy-makers and other stakeholders with a summary of tried and tested diet and physical activity interventions aimed at reducing the risk of chronic NCDs. A second document, *Methodology*, provides researchers and other interested parties with detailed information on the five stages of the methodology used for the review.

This, the third part of *What Works*, provides the detailed results of the review of the evidence evaluating the effectiveness of diet and physical activity interventions.

All documents can be accessed via the DPAS web site at www.who.int/dietphysicalactivity/whatworks.

Description of the evidence tables

All 395 peer-reviewed publications that met the inclusion criteria, as well as the grey literature included, were summarized and rated in evidence tables. In order to assist the reader to find interventions of relevance, the evidence is presented under the eight categories listed below.

- policy and environment
- mass media
- school settings
- the workplace
- the community
- primary health care
- older adults
- religious settings.

Information was extracted on the components of the intervention, on three primary outcome measures, and on other criteria that may be useful for policy-makers seeking a diet or physical activity intervention.

Intervention components

Each intervention is briefly described in the first column of the evidence tables. Generally this includes information on where the intervention took place, the target population, the intervention size, the goal of the intervention and its key components.

Outcome measures

The following outcome measures were considered in the evaluation of the various interventions:

- Psychosocial changes, including knowledge and attitudes related to diet and physical activity, self-efficacy, and stage of change.
- Behavioural changes, including changes in dietary, physical activity, and sedentary behaviour.
- Physical and clinical changes, including blood pressure, body mass index, cholesterol and weight.

Each intervention was assigned three quality rankings, one for each of these outcome measures. The quality rankings are described below.

- *Effective*: These interventions were based on a formative assessment, with a generally robust experimental design or sufficient sample size, and with significant effects on specified outcome variables. They generally met all or most of the planned objectives and would probably be applicable in other settings (disadvantaged communities and low- and middle-income countries),

and demonstrated feasibility and sustainability in their current category. These interventions were most often considered the “example intervention” for the category and specific outcome.

- *Moderately effective*: These interventions lacked one or more of the critical components listed above, but were sufficiently robust to warrant consideration for application in specific settings or groups and met some, if not all of the planned objectives.

- *Promising/Insufficient evidence*: These interventions demonstrated an important trend or a significant effect, but may not have been sufficiently robust in terms of experimental design or sample size, and may therefore benefit from further testing and research.

- *Minimally effective*: Interventions in this ranking had significant, but perhaps not clinically relevant effects in at least one of the outcome areas. The study designs were sufficiently robust and therefore unlikely to yield different or better results through additional testing or in other settings.

- *Insufficient evidence/not shown to be effective*: Here, the study design of the interventions was not robust, and the results sufficiently unremarkable or negative that no further testing or research application are warranted.

- *Not reported/not measured.* The outcomes of these interventions were either not measured, or measured but not reported.

Policy/process implications

Process and policy implications are also highlighted for each intervention. In addition, factors such as intervention fidelity, sustainability, feasibility and cost-effectiveness are considered, where data were available, or where evaluated. Particular attention is drawn to programmes that could be effective in a broader context, or specifically in under-resourced settings.

References

The last column provides the reference(s) for the intervention described. The complete list of references of What Works can be found in Annex 1.

Policy and environment (diet)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
Changing fatty acid composition of cooking oil - Mauritius - Adults (n=2059) - Baseline survey in 1987 and follow-up in 1992 - Aimed at decreasing saturated fats in cooking oil. ***Activities*** - Government regulatory policy.	**Not reported/not measured**	**Not reported/not measured**	**Effective** Total cholesterol fell by 0.79 and 0.82 mmol/l in men women respectively ($P < 0.001$). Estimated intake of saturated fats decreased by 3.5% and 3.6% in men and women respectively.	A cost-effective and sustainable way of reducing saturated fat intake.	*Uusitalo et al. 1996 (28)*
Vending machine pricing strategy - USA - 4 pricing levels: equal price, 10%, 25% and 50% reduction; and - 3 promotional conditions (none, low-fat label, low-fat label plus promotional sign). Low-fat=3 g or less per package. ***Activities*** - Reduced prices of low-fat snacks - Price-of-purchase messages regarding fat content (< 3 g)	**Not reported/not measured**	**Effective** Price reductions of 10%, 25% and 50% were associated with increases in low-fat snack sales. Low-fat snack sales increased by 9%, 39% and 93% respectively. Promotional signage was poorly associated with increases in sales of low-fat snack sales. Overall proportion of low-fat snack purchases increased from 25.7% to 45.8% and returned to 22.8% post-intervention.	**Not reported/not measured**	Average profits per machine were not affected by the intervention. Pricing and promotion had similar effects for adolescent and adult populations. There may be some confusion with respect to public health messages about diet: low-fat message may be interpreted to mean that the portion size is not important. Pricing strategies may be most effective in disadvantaged communities with less disposable income. Policy implications exist with	*French et al. 2001 (14)* *French et al.1997 (13)*

underneath each low-fat item in bright orange.		Sales of regular snacks declined during the intervention from 74.3% to 54.2% and increased post-intervention to 77.2%.		respect to taxation and price supports for foods of differing fat content.	
BEST Study (Budget-friendly, Energising, Sensory/Taste and Time Efficient/ Convenient Properties of Food) - Canada - University students (n=2280 received the intervention and 72 were evaluated) - Two 4-week interventions - Aimed at examining the point-of-purchase effects of advertising on specific food items. ***Activities*** - Point-of-purchase advertising of fruit, vegetables, pretzels and yoghurt (study 1) - Point-of-purchase advertising of yoghurt only (study 2) in the cafeteria - 1 message for each food including at least 1 BEST food choice stimulus	**Not reported/not measured**	**Moderately effective** Study 1: Significant increases in sales of pretzels, yoghurt and whole fruits (not fruit and vegetable baskets). Study 2: Yoghurt sales increased significantly.	**Not reported/not measured**	Using the BEST properties in point-of-purchase interventions may be beneficial in promoting the consumption of healthy foods among university students, particularly when the price of the targeted foods are comparable to less healthy foods.	*Buscher et al. 2001 (7)*

- Messages on posters in cafeteria and on cards in front of foods.					
Supermarket Point of Purchase Intervention - Rural Iowa, USA - Adults: IG=369 at 4 supermarkets; CG=371 at 4 supermarkets - 8-month intervention and post-test at 12 months - Aimed at increasing F&V intake - Based on stages of change model. ***Activities*** - Flyers on F&V for sale - Recipes and menu ideas - Store coupon of 50¢ towards buying F&V - Food demonstrations - Diet-related signage.	**Promising/insufficient evidence** Borderline significant increase in the action or maintenance stage of change in the IG.	**Promising/insufficient evidence** At follow-up, 43% of the IG recalled seeing flyers compared with 6.5% of the CG. 36% of the IG had used a 50¢ coupon and 18% had taken a recipe. However, neither group noted any difference in the amount of F&V bought.	**Not reported/not measured**	This could be a cost-effective way of increasing F&V intake and should be further evaluated.	*Kristal et al. 1997 (17)*
Health messages - New Haven, USA - Upper middle class Caucasians (n=275) patronizing a restaurant - 4 months - Aimed at increasing healthy food choices.	**Not reported/not measured**	**Minimally effective** Price decreases alone resulted in increased purchases of certain healthy items. For all food items, the price intervention had more positive outcomes than the health message	**Not reported/not measured**	Price decreases and subsidies may be more powerful than health messages to increase consumption of healthy foods. More research is needed in disadvantaged communities.	*Horgen & Brownell 2002 (16)*

Activities - Price decreases alone - Health messages alone - Price decreases with health messages.		ones.			
Diet Education and Labelling - Netherlands - Regular shoppers at 13 supermarkets (IG1=863; IG2=601; CG=739) - 6 months - Aimed at reducing fat intake of shoppers - Based on point-of-purchase behaviour. ***Activities*** - IG1=Diet education alone (posters, brochure, recipes and a self-help manual); IG2=Diet education with shelf labelling of low-fat foods; CG.	**Promising/insufficient evidence** The educational programme had a significant effect on intention to eat less fat compared with the CG, but not on other variables.	**Not shown to be effective** Mean fat intake did not differ significantly after the interventions.	**Not reported/not measured**	The authors attribute the lack of effect on the highly competitive supermarket environment.	*Steenhuis et al.2004 (25) Steenhuis et al. 2004 for process evaluation (26)*
LEAN (Low-fat Eating for Americans Now) - Las Vegas, USA - Chefs at 10 sites (n=92) - 2-year project with 6 weeks training for chefs	**Promising/insufficient evidence** Improved knowledge scores although not significant; little change in attitude of chefs. All respondents reported an increased	**Promising/insufficient evidence** Of the 10 restaurants, 5 have continued to designate Las Vegas LEAN items. Many chefs reported improvements in their own behaviour.	**Not reported/not measured**	Providing diet education to chefs is a way for health educators to reach the public, particularly adults in high-income, high-risk groups.	*Palmer et al. 1995 (21)*

- Aimed at helping Americans reduce their fat intake by empowering chefs to develop low-fat menu items. ***Activities*** - 6 training classes for chefs - Tailored menus with low-fat items - Point-of-purchase advertising on the menu of low-fat items.	awareness of fat in foods.				
Towards a healthy diet: Phase of the Shepparton healthy heart project - Shepparton, Victoria, Australia - Adults (IG=591; CG=546) - 3-months and follow-up - Aimed at promoting public health initiatives for a healthy diet. Changing individual behaviour was a secondary goal - Based on social learning theory. ***Activities*** - *Eating places initiative* promoting healthy practices in	**Promising/insufficient evidence** A higher proportion of residents believed that more eating places were offering healthy food, and more local residents were eating healthy food.	**Promising/insufficient evidence** A significant decrease was noted in the frequency of consumption of takeaway food in the IG. More fruit dishes were offered in eating places as well as customer requests for fruit. No great impact was seen in individual dietary behaviour.	**Not reported/not measured**	Some impact on organizational practice (public policy initiatives).	*Dunt et al. 1999 (11)*

food preparation and presentation and customer healthy food choice behaviours - *Schools initiative* aimed at changes in canteen diet policy and food offerings - *General practitioner initiative* with brochures and videos for patients - *Media-based initiative* comprising health education and community events.					
Apache Healthy Stores (AHS) program - Arizona, USA - 2 American-Indian reservations (IG=11 stores; CG=6 stores, n=270 selected) - 1 year (in 6–8 week phases) - Aimed at decreasing obesity by promoting healthier food choices and cooking methods - Based on social cognitive theory and social marketing. ***Activities*** - Increased availability of healthy foods in stores	**Not reported/not measured**	**Not reported/not measured**	**Not reported/not measured**	The process evaluation indicated that the programme was moderately effective and was implemented with a high reach. Interventions should promote healthy beverages as well as food; consider in what phase a particular food is promoted; and devise a way to work more effectively with smaller stores.	*Curran et al. 2005 Process evaluation only (9)*

- In-store (shelf labels and posters) and mass media strategies (newspaper and radio) to increase buying healthy foods
- Cooking demonstrations and taste tests of healthy options.

Policy and environment (physical activity)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
Point-of-Decision Prompts - Worldwide - Signs promoting stair use.	**Promising/insufficient evidence** Success stories illustrate how increases in stair use promote an active lifestyle.	**Moderately effective** Stair use increased with signage.	**Not reported/not measured**	Point-of-decision prompts are widely used because they are inexpensive and can promote an overall active lifestyle.	*Andersen et al 1998 (4) Faskunger et al 2003 (12) Coleman et al 2001 (8) Russell and Hutchinson 2000 (22)*
Health promotion signs - Australia - Hospital workers using stairs instead of elevator. ***Activities*** - Signs at stairs and elevators - Signs displayed for 2 weeks, off for 2 weeks, repeated twice - Footprints on the floor	**Moderately effective** 90% of the sample recognized the signs after the survey. Of these, 38% saw the signs at the stairs and elevator, 30%	**Minimally effective** Only 1% increase in stair use.	**Not reported/not measured**	The initial signage increased usage, and future interventions should keep signage up for longer than 2 weeks.	*Marshall et al. 2002 (18)*

leading to the stairs.	saw the footprints and 18% saw both.				
Sidewalks, safe routes and trails - Australia, Finland, New Zealand and USA - Aimed at improving recreational PA, promoting walking to school and encouraging active commuting.	**Moderately effective** Desire for exercise was common among active commuters. Encouraged more PA in other school activities.	**Moderately effective** Greater activity with increased weekly levels of PA among children and active commuters.	**Not reported/not measured**		*Brownson et al 2000 (6)* *Oja et al 1998 et al (19)* *Staunton et al 2003 (24)*
Cyclovia/Ciclovia - Bogota, Colombia. ***Activities*** - Closing the streets to motorized vehicles on Sundays - Implementing automobile restriction measures - Transforming parking lots into public spaces - Creating 260 km of trails - Improving public transport.	**Moderately effective** Non-participation in *Ciclovia* was associated with inactivity.	**Effective** Women who usually participate in *Ciclovia* are 7 times more likely to be physically active. Public transport improved, and the prevalence of people travelling by automobile dropped from 17% to 12% during peak times.	**Not reported/not measured**	Creating an environment that promotes and supports PA will encourage increased PA for recreation and transport.	*Gomez et al 2004 (15)* *Wright et al.2004. (29)* *www.ciudadhumana.org*
Government policy that endorses and promotes physical activity - Finland and Germany - Finland (n=400); Eastern Germany (n=913); Western Germany (n=489) - *'Sport for All'* policy where PA behaviour reflects the nature of the	**Moderately effective** Finns reported being well informed of opportunities for PA and of good opportunities to be physically active, compared to	**Moderately effective** Finland had a higher percentage of people reported being physically active, with walking being the most common activity.	**Promising/insufficient evidence**	A PA policy orientation that emphasizes the whole population seems to be related to better opportunities and infrastructure for sports and PA. This study suggests a relationship between policy orientation, physical environment and PA participation.	*Stahl et al 2002 (23)*

PA policy. ***Activities*** - Public telephone survey carried out as part of the international MAREPS project (Methodology for the Analysis of Rationality and Effectiveness of Prevention and Health Promotion Strategies).	their German counterparts. East German policies and facilities geared more towards competitive sports.				
Community Gardens - California, USA - California Healthy Cities established community gardens in response to a request for proposals to improve community diet and PA, or to enhance food security. ***Activities*** - Technical assistance provided to local coordinators and collaboratives - 2 city councils purchased land for gardens, and provided staffing on an ongoing basis - Members included residents, partner institutions (e.g. schools, county health departments, universities), and volunteers (e.g. businesses, civic associations).	**Moderately effective** Skills developed in leadership, community organization, cultural competency, and programme planning, implementation, and evaluation.	**Moderately effective** Self-reported survey results demonstrated that participants increased the number of PA sessions from 4.9 to 5.2 times per week (6%) and increased consumption of F&V from 3.4 to 3.8 servings per day (10%).	**Not reported/not measured**	Lessons learnt included the importance of ongoing training, mentoring, and leadership development for gardeners and staff; building on successful community-based programmes through partnerships; and the need for public awareness of the benefits of community gardens.	*Twiss et al 2003 (27)*

Rail trail in western Sydney - Australia - Target groups were potential cyclists and pedestrians located within 5 km of the Rail Trail in 4 local government areas. ***Activities*** - Local campaign with brochures and maps containing information about the 16.5 km cycleway associated with the railway system - Telephone survey using CATI system concerning walking and cycling behaviour - Samples were coded as "inner" or "outer" depending on the distance from the trail (1.5–5 km versus >5 km).	**Moderately effective** There was a 2.9% increase in unprompted trail awareness on interview.	**Promising/insufficient evidence** There was an increase in the proportion of cyclists achieving a sufficient level of activity in the "outer" areas; little change in walking hours for pedestrians; and increased cycling hours for "inner cyclists". Results were related to ethnicity, with the greatest increases in people without an English-speaking background. Overall, 27% of people increased their walking and cycling time per week by over an hour.	**Not reported/not measured**	This study demonstrated that a short-term media campaign associated with a structural or environmental change can enhance awareness of PA opportunities, and thereby participation. However, the study showed that changes in behaviour may not be sustained, or may only be experienced by specific communities or target groups. The study highlights the need for authorities to continue to encourage "patronage" of the trail.	*Merom et al., 2005 (271)*
"Bootheel" region trail use - USA - Missouri "bootheel" region and in 6 comparison communities in Arkansas and Tennessee. - A quasi-experimental design in walking behaviour in 6 rural intervention communities	**Not measured**	**Promising/insufficient evidence** Walking trail use increased in 2 of the 76 sites. However, overall time spent walking did not increase.	**Not reported/not measured**		*Brownson et al., 2004 (5)*

(range in population from 2399 to 17 642).
Activities
- Interventions were developed with community consultation, some individually tailored newsletters and activities, as well as community-wide activities (walk-a-thons).

Mass media (diet)

Intervention components	Outcomes				*Reference*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**	**Policy/process implications**	
California 5-A-Day–For Better Health - California, USA - General population - Since 1988 - Aimed at increasing F&V intake through 5 programmes: (1) Children's 5-a-Day, (2) Latino 5-a-Day (reported here), (3) African-American 5-a-Day, (4) 5-a-Day Retail, (5) 5-a-Day Active! Worksite. ***Activities*** - Mass media; partnerships; improved access to F&V;	**Moderately effective** Increased awareness of F&V to prevent cancer risk (see specific settings).	**Moderately effective** Increased F&V intake (see specific settings).	**Not reported/not measured**	In 1991, the campaign was adopted as a national initiative. By 1994, there were over 700 industry organizations, 48 state territories and the District of Columbia licensed to participate. To date, only the Child and Latino 5-a-Day programmes have been evaluated.	*Foerster et al 1995) for history (39)* *See Foerster et al.1998 for Children's 5-a Day under school setting (91)* *See Backman & Gonzaga 2003 for Latino 5-a Day under community setting (228)* *See Resnicow et al. 2004 for*

environmental changes and many more.					*African Americans under church setting (390) See Backman & Carman for Worksite programme under workplace setting (174)*
Green Keyhole campaign (GK) - Gothenburg, Sweden - Adult women (n=616) - Evaluated 3 years after introduction - Aimed at persuading consumers to select low-fat, high fibre foods. ***Activity*** - Logo in the form of a "green keyhole" that indicates high fibre, low-fat foods.	**Moderately effective** 62% of women adequately understood the meaning of the GK logo.	**Moderately effective** Those with higher knowledge of the GK logo had higher ratios of PUF to SFA and fibre intake per 1000 kcal, and their intake of saturated fats were significantly lower.	**Not reported/not measured**	A cost-effective way of educating the public about specific foods.	*Larsson & Lissner 1996 (43)*
Fat watch campaign - Alkmaar, Netherlands (pilot study for national campaign) - Dutch consumers (IG=500; CG=500) - 3-year intervention, evaluated each year. - Aimed at decreasing fat intake of population by 10% - Based on model of	**Moderately effective** 56% of the community was aware of, and approved the campaign. Positive attitudes and intention to buy low-fat foods occurred in the second year, but less in the third year.	**Moderately effective** There was a significant difference in the actual fat consumption of the IG pre- and post-test. After the campaign more people in the IG continued to eat low-fat foods.	**Not reported/not measured**	This type of intervention may be best suited to a developed country context with good mass media and advertising resources. The evaluation indicated that the Dutch underestimated their personal fat intake, which is a barrier for any further reductions. The researchers recommend giving priority to sensitizing subjects to their personal fat	*van Wechem et al. 1997 for pilot study (61) van Wechem et al. 1998 for evaluation of overall programme (60) van der Feen de Lille et al. 1998 for*

behavioural change through education. ***Activities*** - Mainly used intermediaries like hotels or supermarkets to conduct activities for the population (project team had training meetings for the intermediaries) - intermediaries were offered multi-component activities, i.e. demonstrations, exhibitions, fairs, posters, menu changes, store tours, newspaper articles.				intake in future campaigns. Campaign awareness in the target group was relatively high in the first year (60%) but dropped in the following 2 years (40% and 32%).	*process evaluation (59)*
Heartbeat Award Scheme (HBA) - Wessex, United Kingdom - 3 eating categories: public eating places, workplaces and educational establishments (IG=380 premises; CG=306 premises) - Aimed at investigating the impact of the campaign on catering practices. ***Activities*** - Award scheme had the following criteria: (1)	**Moderately effective** 76% believed they offered healthier meals, 54% believed they offered a smoke-free environment and 48% believed they offered a higher standard of hygiene.	**Moderately effective** 35% indicated they increased customer numbers since receiving the award. The Heartbeat Award Scheme premises provided more healthy food, were more likely to highlight healthy items and to actively promote healthy eating.	**Not reported/not measured**	The award scheme may increase consumer choice of healthy foods. However, conclusions cannot be drawn on the impact on eating habits.	*Warm et al. 1997 (63)* *See also Holdsworth et al. 2000 under workplace setting (198)*

at least a third of meals had to be healthy choices (low in fat and rich in starch and fibre), (2) at least a third of seating non-smoking, and (3) at least a third of food-handling staff received food hygiene training.					
Two fruits and five vegetables every day campaign - Victoria, Australia - Adults over 20 years (n=500) - 3-year intervention evaluated every year - Aimed at increased F&V intake - Based on social marketing theory. ***Activities*** - Aimed at consumers, health professionals, food service providers and industry - TV, radio and print advertising - Sports sponsorships - Point-of-sales promotions - Industry partnerships.	**Moderately effective** High levels of campaign awareness were achieved during the most intensive promotion phases. There was also a significant increase in beliefs about appropriate F&V consumption.	**Moderately effective** Significant reported consumption of F&V observed during the most intensive phases of the study.	**Not reported/not measured**	The results suggest that significant achievements can be made with relatively low-budget mass media promotion of dietary recommendations. However, campaigns may need adequate resources over several years if sustained change is to be achieved.	*Dixon et al 1998 (38)*
Minnesota Heart Health Programme – Class of 1989 Study	**Moderately effective** Greater knowledge of healthier food choices	**Moderately effective** Greater healthy food choices for women.	**Not reported/not measured**	The results suggest that school-based health education interventions are	*Kelder et al. 1995 (42)*

- Minnesota, USA - Peer-led diet education programme - 1 intervention and 1 matched community (n=2376) - 5 years, starting in sixth grade - Aimed at reducing CVD and promoting health-enhancing behaviours among adolescents. ***Activities*** - School-based behavioural health programmes focused on smoking, PA and healthy diet - Population-wide intervention: risk factor screening, food labelling at restaurants and supermarkets; educational campaigns; mass media education; adult and youth education.	in the IG.	Both men and women showed greater restraint in salting behaviour.	strengthened by complementary community-wide strategies. Diet interventions should focus more on directly influencing dietary behaviours than on strategies to influence knowledge alone.	
1% or less campaign: Mass media to promote healthy eating - Clarksburg and Bridgeport, West Virginia, USA - Population of 35 000 of	**Not reported/not measured**	**Effective** Low-fat sales increased from 18% at baseline to 41%. At post-test, over 38% reported having switched to low-fat milk. Most (93%) of the respondents exposed	**Not reported/not measured**	*Reger et al. 1998 - used media in combination with other community strategies (140)*

which IG=257; CG=248 were interviewed before and after campaign - 3 one-month periods and follow-up at 6 months - Aimed at changing from high-fat to low-fat milk to reduce saturated fat intake - Based on model of behavioural change through education. ***Activities*** - Mass media: paid advertising on TV, radio and newspapers - Public relations - Community-based programmes.		to the campaign saw the paid advertising.			
1% or less campaign: Mass media to promote healthy eating - Wheeling, West Virginia, USA - Population of city 35 000 of which IG=285; CG=258 were interviewed before and after campaign - 6 weeks and follow-up at 6 months - Aimed at changing from high-fat to low-fat milk to reduce saturated	**Not reported/not measured**	**Effective** 34.1% of high-fat milk drinkers switched to low-fat milk versus 3.6% in the CG ($P < 0.0001$). Low-fat milk sales increased from 29% to 46%.	**Not reported/not measured**	Total cost of implementation and evaluation, excluding the costs of developing the materials, was US$ 43 000, or 10¢ per person. The media-only approach was enough for a significant proportion of people to alter the dietary habit targeted by the intervention. A simple message targeting one behaviour is advised rather than multiple messages for complex behaviours.	*Reger et al. 1999 –used media only (54)*

fat intake - Based on model of behavioural change through education. ***Activities*** - Mass media only: paid advertising on TV, radio and newspapers - Public relations.					
Heartfile campaign - Pakistan - Adult newspaper readers (n=500 people interviewed immediately after the campaign) - 130 weeks - Aimed at reducing CVD risk behaviours - Based on model of behavioural change through education. ***Activities*** - Illustrated newspaper articles placed by *Heartfile* in a national English newspaper in Pakistan.	**Promising/insufficient evidence** 87%, 77% and 85% indicated that the articles supplemented their knowledge on diet, PA and smoking respectivey.	**Promising/insufficient evidence** 40% and 39% stated they had made some dietary and PA changes respectively.	**Not reported/not measured**	This may be a very cost-effective way of reaching many people. According to the researchers, the cost per article was US$ 169, and articles were read by 660 000 people. Newspaper articles seem a useful supplement to other health education activities as part of CVD prevention programmes. However, more research is needed on the outcomes with regard to the validity of self-reported results.	*Nishtar et al. 2004 (49)*
Television health promotion intervention - Czech Republic, Hungary, Poland and the Russian Federation - Adults aged over 18 years (n=970) - Aimed at improving knowledge of healthy	**Promising/insufficient evidence** Most viewers indicated that they had learnt useful information.	**Promising/insufficient evidence** 30% or more intended to change their lifestyle, of which about 25% indicated they would eat more F&V. 17–45% reported dietary changes consistent	**Not reported/not measured**	This type of intervention holds great promise for a cost-effective tool to change population knowledge and attitudes. However, more trials are needed.	*Chew and Palmer 2005 (35)*

diet, alcohol, smoking and PA - Different conditions and timing in each country - Based on stages of change theory. ***Activities*** - TV programmes and/or videotapes on the 4 health topics.		with health promotion.			
Healthy Children Healthy Futures: Media messaging to promote healthy eating and physical activity—pilot - Atlanta, Los Angeles and New York, USA - Children (10 after-school sites; n=93); in urban minority youth - 12 weeks - Based on social learning theory and theory of reasoned action. ***Activities*** - Curriculum delivered during after-school programmes - Diet and PA education and activities - Media messaging (developing healthy eating and PA	**Promising/insufficient evidence** Significant improvement in knowledge related to PA and F&V intake. Borderline significance in portion size knowledge.	**Not reported/not measured**	**Not reported/not measured**	No CG..	*Carter et al 2005 (34)*

messages for the media)
- Events to present media messages
- One-day training for facilitators.

Mass media (physical activity)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
"VERB" campaign - Nationwide, USA - n=3120 - Follow-up at 1 year - Based on social marketing theory. ***Activities*** - Paid advertisement on TV channels aimed at children (US$ 125 million budget) - Focus was for children to "find their verb" - Aim was to get 85% of 9–13-year-olds to see the VERB advertisement - Supported by print advertisement, in-school promotions, radio and Internet exposure.	**Effective** Overall awareness of the campaign was 78% for Caucasian children, 70% for Hispanic children, and 63% for African-American children.	**Effective** Significant relationship between awareness of the message and median sessions of free-time PA. Greatest effect in 'at-risk' groups of younger children, those with low baseline levels of PA, or those with low household incomes or parental education. The 9–10-year-olds who were aware of the campaign engaged in 34% more free-time PA sessions per week than those who	**Not reported/not measured**	This is the first example of a paid, national mass media campaign intended to change PA behaviour, particularly in children. This campaign was different in its level of investment and use of commercial marketing tactics, which substantially increased costs. The programme combined mass media with a multi-pronged approach downstream in schools, and addressed local and environmental barriers to participation. It comprised a process evaluation, including gross ratings for media exposure, longitudinal tracking of brand awareness/ understanding and on-	*Huhman et al., 2005 (41)* *www.cdc.gov /YouthCampaign/research/process.htm*

		were unaware.		site evaluation of VERB-related events.	
Agita São Paulo - São Paulo, Brazil - Main targets were students, workers and the elderly, at different stages of behavioural change - Launched in 1996, ongoing - Based on social marketing and transtheoretical models. ***Activities*** - "Mega events" of 1 day involving a million or more people - Partner organizations (n=300) who committed to the Agita message arranged their own ongoing activities.	**Effective** 53% of the city of São Paulo was aware of the campaign in 2002. From 1999 to 2002, awareness in São Paulo State increased from 9.5% to 24%.	**Moderately effective** The prevalence of PA increased. This increase was higher among those who knew of Agita than those who did not (43% versus 35%). 54% of those aware of the campaign were physically active.	**Not reported/not measured**	The success of this programme has been attributed to the promotion of a simple and clear message. The information is scientifically based, relationships are established to provide political and technical support, and a network of partner institutions promote Agita.	*Matsudo V et al. 2001 (44)* *Matsudo S et al., 2003 (46)* *Matsudo S et al., 2004 (45)*
Canada on the Move - Nationwide, public–private partnership between Canadian Institutes for Health Research and Kellogg Canada - Monthly rolling sample of more than 9700 adults, who were surveyed on walking, PA behaviour and awareness of campaign. ***Activities*** - Web-based platform to collect walking and pedometer data - Kellogg Canada promoted	**Effective** Good message recall and awareness; and the use of pedometers increased significantly over the period of promotional activity.	**Effective** There was a dose-response relationship between the number of messages recalled and the extent of pedometer use in adults. Awareness of the campaign was associated with 13% higher odds of sufficient levels of weekly walking (after	**Not reported/not measured**	This campaign was seminal in that it combined a public–private partnership, had a population-wide reach using commercial marketing strategies, instigated population-based research using the Internet as an interface, thereby creating a platform for public health research. The campaign was evaluated at a variety of	*Spence et al., 2006 (57)* *Plotnikoff et al., 2006 (52)* *Craig et al., 2006 (36)* *Craig et al., 2007 (37)*

walking (tag line 'add 2000 steps') through a mass media advertising campaign - Mass distribution of pedometers via cereal boxes - Pedometers invited recipients to "donate their steps to health research".		adjusting for demographics). Awareness of the tag line of the campaign was also associated with 5.6% more people walking sufficiently.		levels, including proximal outcomes such as awareness of the tag line, as well as the distal impact, in terms of walking PA prevalence.	
"Fighting Fat, Fighting Fit" (FFFF) - United Kingdom - More than 237 000 people requested information packs, 33 474 (14%) of whom registered - Targeted those who were classified as overweight or obese, largely women - Evaluation was conducted in a sub-sample (n=3661) of 6000 sampled, or 61% response rate - 7 weeks - Based on social cognitive theory. ***Activities*** - Peak TV and radio programmes, supplemented by an educational booklet on PA and healthy eating - Fighting Fat, Fighting Fit book could be purchased - Main message: weight problems are best solved with small but sustainable changes	**Moderately effective** 57% of the British population was aware of the campaign. Weight satisfaction improved in participants, along with a reduction in emotional eating.	**Moderately effective** Brisk walking, moderate and vigorous PA increased. 39% of participants increased habitual PA levels by 94 ± 181 minutes per week. The percentage of people classified as sedentary decreased from 34% to 25%.	**Moderately effective** The number of people classified as obese decreased by 6%.	Most of those responding and registering with the campaign were overweight or obese women aged 25–64 years old, with some educational qualifications. The important aspect of this campaign was its successful recruitment of the target group. Furthermore, it was possible to develop models of determinants of behaviour and weight change. The major independent predictor of weight loss, adoption of healthy eating and/or increased levels of PA was involvement in the first 5 weeks of the programme. However, obese subjects generally showed less	*Wardle et al., 2001 (62)* *Miles et al., 2001 (47)*

to diet and PA - Rewards (e.g. vouchers for gym sessions) given at registration and at subsequent weight loss.				favourable outcomes. The biggest drawback of this evaluation is the lack of a CG, and self-reported measures of change. Although this may lead to an over-estimate of effect, the potential health benefits of such a campaign are substantial.	
New South Wales: Active Australia - Australia - n=2009, men and women - One-year campaign - Targeted 25–60-year-olds who were "motivated but insufficiently active" - Based on paid media and social marketing. ***Activities*** - Two 15-second TV commercials for 200 showings - 6-week print media advertisements in weekend and daily editions - Included multi-lingual component for minority communities.	**Effective** Recall of campaign message increased from 2.1% to 20.9%. Recall of campaign tag line also increased, as did knowledge about PA.	**Effective** The number of people exercising $\geq$ 30 minutes/day at least 5 days/week increased by 25%.	**Not reported/not measured**	This campaign employed 'prime-time media' in conjunction with other communication channels and demonstrated notable changes in awareness, knowledge and self-reported PA. These changes were corroborated using 2 separate models, including multiple cross-sectional samples and a cohort measured before and after the campaign (4-month proximal outcomes). Mass media campaigns have been shown to be more effective in the long-term when combined with supportive interventions and integration across various sectors,	*Bauman A et al., 2001 (32)*

				involving not only health, but recreation and parks, education, and even transport.	
Rockhampton 10,000 Steps - Rockhampton, Australia - 2-year campaign - 5 strategies to promote PA: (1) media campaign, (2) physician and health-care professionals (n=66), (3) workplaces, (4) local government, (5) community groups - Based on paid media campaign and social marketing principles. ***Activities*** - Exposure to mass media campaign - Workshops on PA counselling techniques - Medical practice visits and counselling materials supplied - Pedometer loans for medical practices.	**Moderately effective** 91% of the practices accepted visits from campaign staff, and 58% participated in educational meetings.	**Moderately effective** 100% of the practices displayed campaign resources, 81% of the practices used campaign resources and 95% took pedometers on loan.	**Not reported/not measured**	Mass media campaigns could achieve greater success and impact by sensitizing physicians to the message and providing support to disseminate PA information and advice. This campaign achieved high rates of uptake by general practitioners and reasonable levels of implementation, resulting in a significant impact on the number of community residents counselled on PA. These results suggest that evidence-based primary care PA counselling protocols can be translated into routine practice. However, success is, in part, dependent on partnerships with relevant health-care organizations.	*Eakin et al. 2004 (311)* *http://10000steps.org.au*
Wheeling Walks/BC Walks Wheeling Walks (WW): - Wheeling, West Virginia, USA (n=1472)	**Moderately effective** WW campaign awareness ranged	**Effective** WW participants increased walking by 2 days per	**Not reported/not measured**	Community members assisted with the planning process, thereby making the	*Reger et al., 2002 (53)* *Reger-Nash et al.*

- 12-month campaign - Targeted sedentary and insufficiently active 50–65-year-olds - Based on paid media and social marketing principles. ***Activities*** - Campaign had 4 phases. Phase 1: Planning process (12 weeks) with multisectoral representatives; Phase 2: Mass media campaign of TV, radio and newspapers (8 weeks) recommending 30 minutes moderate PA; Phase 3: Booster campaign in month 11 (TV, radio, newspaper); Phase 4: Free walking clinic for 16 weeks. <u>BC Walks</u>: - Broome County, New York, USA (population 200 536) - Targeted insufficiently active adults aged 40–65 years, who comprise 32% of the county's population, or 36 080 adults - Promoted walking during the 8-week period 1 May to 26 June 2003 - Aimed to move at least 15% of people to the next level based on the transtheoretical model. ***Activities*** - Paid media, public relations (including a speakers' bureau), and community health activities.	from 85% to 92% over 12 months. BC Walks news media relations resulted in 28 TV news stories, 5 radio stories, 10 newspaper stories and 125 TV news promotions. BC Walks exposure to the campaign was reported by 78% of people.	week and 20 minutes per day. In BC Walks, 47% of respondents reported an increase in weekly walking time against 36% in the CG.	message more culturally applicable. The increase in walking after the first 8 weeks of the campaign was maintained at 12 months and could possibly be related to booster campaigns and a free walking clinic. Again, the factors affecting uptake or "mediators of change" in the social marketing model need to be better understood in order to increase the overall effectiveness of similar campaigns using paid media.	*2006 (55)*

"Push-Play" campaign - New Zealand - Media-led, community-wide campaign - 1999 to 2002 - Based on social marketing model. ***Activities*** - The 'Push-Play' campaign (a "play on words" related to a TV remote control) recommended 30 minutes of daily, moderate-intensity PA - Emphasis was PA as fun, part of community life, and easy to achieve - Downstream structures at community level and in primary care to support the programmes and events of the campaign - Monitoring of proximal outcomes such as message awareness, recognition of the Push-Play logo, intention to be active, and recent activity.	**Effective** Awareness of the message increased from 30% in 1999 to 57% in 2002. The number of adults who intended to be more active also increased, from 1.8% in 1999 to 9.4% in 2002.	**Insufficient evidence/ promising** No sustained changes in PA levels. 5.8% increase only in the first year of the campaign.	**Not reported/not measured**	This programme was innovative in that it combined a population-wide strategy with downstream support structures. There was evidence for dissemination and penetration of the message, and an intention of the population to become more physically active, but these changes were not sustained. A key factor in implementing such a programme at national level is to identify determinants and barriers to change at individual level, which can be used within the intervention structure of the campaign.	*Bauman et al., 2003 (31)*

National healthy lifestyles programme - Singapore - National healthy lifestyles programme aimed at preventing NCDs - Initiated in 1992, demographic surveys completed in 1998 and 2004 (representative sample of over 4100 people) - No CG. ***Activities*** - Combines innovative media and communication strategies with capacity development in the form of skills training, working intersectorally within government, creating supportive environments at the community level (workplaces and schools) and collaborating with the food industry.	**Not reported/not measured**	**Insufficient evidence/ promising** There was a major improvement in population levels of health-enhancing PA, from 17% in 1998 to 25% in 2004 ($P < 0.001$).	**Insufficient evidence/ promising** There was an 8% reduction in elevated cholesterol; 4% reduction in impaired glucose tolerance and hypertension; no change in prevalence of obesity; and a 2.5% reduction in smoking prevalence from 1998 to 2004 (all at least $P < 0.01$).	These results reflect changes from the 1998 and 2004 surveys. This is an important point-of-clarification, as the results during the first 6 years of the programme were less remarkable or promising. It was determined that a contributing factor to the lack of effectiveness had been the passive nature of the programme, with the communities being largely recipients. Since the 1998 survey, communities have been actively engaged with government sectors to develop local programmes to promote the objectives of the programme.	*Bhalla et al., 2006 (33)*
Heart to Heart - South Carolina, USA - n=3193 (1642 IG and 1551 CG) - 4-month campaigns, ongoing activities for 5 years - Aimed to reduce risk factors for CVD. ***Activities*** - Community-wide campaigns for PA, smoking cessation and healthy eating - Ongoing awareness	**Moderately effective** Knowledge and awareness of CVD increased.	**Not shown to be effective** Prevalence of inactivity increased (non-significant).	**Minimally effective** Cholesterol concentration improved; hypertension decreased in CG and increased in IG.	The 5-year programme cost US$ 2.2 million. Minimal changes in PA and CVD risk profile may have been due to conflicting programme goals, inadequate qualifications of staff and time pressure. However, the programme did have positive outcomes for the environment,	*Goodman et al. 1995 (40)*

activities in electronic and print media, billboards, notice boards and presentations.				including the establishment of marked walking paths.	
Otsego-Scholharie healthy heart programme - Rural counties in New York, USA - n=628 - 5-year programme - Aimed to reduce prevalence of CVD risk factors particularly in isolated villages and populations - Based on knowledge-attitude-behaviour model. ***Activities*** - Promoted local walking groups - Radio, print media, brochures (no local TV stations) - Fact sheets distributed at workplaces, supermarkets, medical practices and schools.	**Insufficient evidence/ promising** Physicians noted that more patients asked for information on cholesterol.	**Insufficient evidence/ promising** The number of sedentary individuals decreased from 73% to 61% in the IG.	**Moderately effective** Systolic blood pressure, high density lipoprotein, cholesterol and triglyceride concentrations all improved. BMI increased in IG and CG.	The programme was tailored for each community. The community-based health forums played an important role in the dissemination of information. The strong community involvement is likely to account for differences between this, and more generic campaigns in terms of behaviour and clinical outcomes.	*Nafziger et al. 2001 (48)*
Stanford five-city project - California, USA - n=2239 at baseline - Measurements after 25, 51 and 73 months - Multiple target groups in a variety of settings - Dissemination of information on benefits of PA. ***Activities*** - English and Spanish printed materials including a 16-page	**Minimally effective** Knowledge increased in men living in the treatment cities. There was no change in attitudes or self-efficacy for PA.	**Minimally effective** Daily energy expenditure increased in men in one treatment city. Vigorous PA at least once per week increased in men. Total energy expenditure did not increase in	**Not reported/not measured**	The comprehensive multi-city intervention programme aimed to increase PA. However, there was only an average of one PA message contact every 6 weeks in the intervention city. Targeted campaigns may have achieved greater increases in PA	*Young et al. 1993 (64)*

booklet - Weekly newspaper column - Talks, seminars and workshops - Community-based walking events - TV: Four 3-minute segments aired during evening news - Video tape on exercise - Workplace and school-based programmes.		men or women.		through a higher frequency of the message.	
Heartbeat Wales - Wales, United Kingdom - n=18 538 at baseline - Follow-up at 5 years - Aimed at changing health behaviour in individuals and influencing policy to support healthy choices - Based on social marketing and an ecological model, to some extent. ***Activities*** - TV series - Educational promotions including workplace health promotion - PA message: moderate to vigorous PA at least twice a week for over 20 minutes per session.	**Insufficient evidence/ promising**	**Minimally effective** Insignificant increase in prevalence of PA in IG and CG.	**Not reported/not measured**	This programme had a number of positive outcomes including improved diet, decreased fried food intake, and smoking cessation. The PA message was not aligned with current recommendations.	*Tudor-Smith et al. 1998 (58)*
Heartfile - Pakistan - CVD prevention programme - Focus on policy-building, reorienting health services, and developing community	**Promising/insufficient evidence** 77% of people interviewed indicated that the articles	**Promising/insufficient evidence** 39% of people interviewed indicated they had changed their PA		This intervention demonstrated excellent reach. At only US$ 169 per article, the articles were potentially read by more than half a million	*Nishtar et al., 2004 (49-51)*

interventions through print and electronic media, and outreach at a local level - Based on social marketing strategies. ***Activities*** - Largest newspaper (English language) donated space for health education for NCD for 130 weeks - Telephone survey was conducted (n=500).	supplemented their knowledge of PA and health, 9% of whom said this was their sole source of knowledge. 87% said the articles had improved their knowledge of diet, with 5% saying it was their sole source of information.	habits; 8% reported reduced tobacco use; and 40% reported dietary changes.		people. These are important findings in disadvantaged communities, and proximal measures of recalling the message are promising.	
Isfahan healthy heart programme - Iran - 2 intervention counties and 1 reference county. ***Activities*** - Community-wide intervention over 4–5 years to improve healthy behaviours and PA levels in the population, while lowering cholesterol, blood pressure and smoking - Operated at individual, group and community levels, using mass media, health services, community partnerships, policies and legislation - Focused on activities that were simple, practical, from within existing resources, feasible for national implementation, and sustainable.	**Not reported/not measured**	**Not reported/not measured**	**Not reported/not measured**	While the only outcome data published so far in the peer-reviewed literature are baseline risk factor prevalences, this is an important mass media intervention, linking a community campaign in a non-Western, culturally distinct setting. As such, outcomes should be closely monitored for effectiveness.	*Sarraf-Zadgan et al. 2003 (56)*

School settings (diet)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
Know Your Body (adapted) school health promotion programme - Crete, Greece - Primary-school children - 6-year intervention - Targeted children from first through to sixth grade (aged 5.5 to 11.5 years) - Aimed at promoting healthy lifestyle habits in order to minimize the risk of developing CVD in adulthood - Based on social learning theory. ***Activities*** - Curriculum: health and diet (13–17 classroom hours/year) - PA programme (2 x 45 minute sessions/week including 4–6 hours of classroom material per year) - Parental involvement (homework worksheets, leaflets and seminars).	**Effective** Health knowledge scores improved in the IG, but no change in the parents.	**Effective** After 6 years, a significant improvement was found in PA levels, as well as in dietary energy, total fat, monounsaturated fat and saturated fat intake in the IG.	**Effective** Significant improvements in BMI, skinfolds and cholesterol levels in the IG.	Trained teachers provided the diet component of the intervention, and physical education teachers the PA. There were 45–50 hours of intervention activities each year. High parental participation contributed to good outcomes as did the long duration of the intervention and teacher compliance in delivering the programme.	*Manios et al. 1999 (122)* *Manios and Kafatos 1999 (120)* *Manios et al. 2002 (123)*

PATHWAYS - Arizona, New Mexico and South Dakota, USA - American-Indian children in 41 schools (IG=727, CG=682 children, n=1150 for psycho-social factors) - 3-year intervention - Targeted third to fifth grade children (aged 8–11 years) - Aimed at obesity prevention, decreased energy and fat intake - Based on combined constructs from social learning theory and principles of American-Indian culture. ***Activities*** - Classroom curriculum to promote healthy eating behaviours and PA (2 x 45 minutes over 12 weeks/year for third and fourth grades and for 8 weeks during fifth grade) - PA programme - Change in fat content of meals offered in canteen - Parental involvement.	**Effective** There was a significant increase in knowledge, cultural identity and in food choice intentions, but no difference in self-efficacy to choose healthy foods. Retention of knowledge over the 3 years was also significant.	**Effective** A significant decrease was noted in dietary energy (–265 kcal) and fat intake (–2.5%).	**Not shown to be effective** The percentage of body fat and BMI did not significantly change.	The programme was comprehensive and focused on cultural identity. Trained teachers carried out the intervention. Several indigenous learning modes, e.g. story-telling, were used. A sustainable feature was that teachers themselves carried out the intervention, which also made it cost-effective. Of the family-based components, giving children family packs and family events at school were the most successful. The process evaluation found that the interventions were successfully implemented with good reach, high extent and fidelity.	*Caballero et al. 2003 78* *Davis et al. 2003 (81)* *Teufel et al. 1999 for family evaluation (156)* *Stevens et al. 2003 for psychosocial variables (158)* *Steckler et al. 2003 for process evaluatio (157)*

APPLES (Active Programme Promoting Lifestyle Education in School) - Leeds, United Kingdom - Primary-school children in 10 state schools (IG=292; CG=303) - One-year intervention - Targeted grades 4 and 5, aged 7–11 years - Aimed at obesity prevention. Dietary aims were to decrease intake of high-fat and sugar foods and to increase F&V intake - Based on the Health Promoting Schools concept, a holistic approach focusing on the school, home and community. ***Activities*** - Curriculum to include healthy diet - PA programme/playground activities - Change in foods offered in school meals/tuck shops.	**Moderately effective** Greater understanding was noted of the health benefits of diet and PA.	**Insufficient evidence/ promising** Higher levels of self-reported behavioural change were noted. Results showed an average of one third of a portion more per day vegetable intake from 24-hour recall, but not from the 3-day diary.	**Not shown to be effective**	This programme was carried out by trained teachers, but only ran for 12 months. The lack of better outcomes may be due to the short period of the intervention. A high level of support for diet education and PA was expressed by both teachers and parents.	*Sahota et al. 2001 (146)* *Sahota et al. 2001 for process evaluation (147)*
CATCH (Child and Adolescent Trial for Cardiovascular Health) - 4 centres: San Diego, Minneapolis, Houston, New Orleans, USA - Children at 96 public schools (IG=56, CG=40, n=5106) - 3-year intervention - Targeted children in grade 3 at baseline and grade 5 at completion (8–11 years) - Aimed at reducing CVD risk factors. Dietary aims were to	**Effective** Significantly improved knowledge, intentions, self-efficacy, usual behaviour and perceived social reinforcement for healthy food choices were noted in the IG after 3 years. The	**Moderately effective** Students in the IG significantly decreased total fat intake from 32.7% to 30.3% and saturated fat from 12.8% to 11.4%. No significant changes were reported in F&V intake. Significantly lower self-reported total fat intake and	**Minimally effective** No changes were found in the IG or CG in obesity, blood pressure or serum lipids. Total cholesterol decreased in the IG.	Trained teachers provided the intervention. Dose effects were found for knowledge and attitudes according to parental involvement, suggesting the importance of a family component. Similarly, many positive dietary and PA effects continued up to grade 8. The general diet intervention was not sufficient to change F&V	*Webber et al. 1996 for clinical outcomes (166)* *Edmundson et al.1996 for knowledge and attitudes (84)* *Lytle et al. 1996 for individual*

decrease fat, saturated fat and serum lipids and to prevent obesity - Based on social cognitive theory. ***Activities*** - 1 intervention with school only component (curriculum, PA and food service component) - 1 intervention with school component (as above) plus family involvement.	effects in diet knowledge and intentions persisted in grade 8 in the IG.	higher PA were found in grade 8 of the IG.		intake. Thus, targeted food-based messages may be required. Staff training seems to be an important factor in achieving institutionalization of these programmes. Health education programmes also need to be compatible with school policy and priorities if they are to be adequately institutionalized.	*nutrient intakes (118) Nader et al. 1996 for parental effects (125) Nader et al. 1999 for maintenance of improved diet (126) Hoelscher et al. 2004 for maintenance of school-level changes (106) Luepker et al. 1998 for summary (115) Perry et al 1998 for F&V intake (138)*
CATCH (Child and Adolescent Trial for Cardiovascular Health): eat smart food service intervention - San Diego, Minneapolis, Houston, New Orleans, USA - 96 schools (IG=56, CG=40) for school lunch analysis and 59 schools (IG=35, CG=24) for school breakfast analysis - Two-and-a-half years - Targeted food service staff and administrators - Aimed at lowering total fat,	**Not reported/not measured**	**Effective** <u>National School Lunch Programme</u> Significant reduction in percentage of calories from total fat (–4.1%) and saturated fat (–1.3%) in school meals in the IG. <u>Breakfast Programme</u> Minor decreases in both groups occurred for % E from fat.	**Not reported/not measured**	School meals remained healthier 5 years after completion of the interventions: CATCH Eat Smart programme assisted school cafeterias to meet the guidelines (< 30% E fat and < 10% E saturated fat).	*Osganian et al. 1996 for school lunches (133) Dwyer et al. 1996 (for school breakfasts (83) Hoelscher et al. 2004 for maintenance of school-level changes (106) Hoelscher et*

saturated fat and sodium in school meals, while maintaining recommended amounts of energy and nutrients. ***Activities*** - National School Lunch Programme and School Breakfast Programme - Training sessions, educational materials, newsletter and ongoing support visits - Guidelines and standards - Training primarily devoted to lunch-related modifications.		Saturated fat decreased significantly (–1.6%), but the sodium goals were not achieved. Recommended amounts of calories and essential nutrients were maintained at lunch and breakfast. At post intervention after 5 years, 50% of IG met guidelines for fat versus 10% CG and versus 17% of unexposed school cafeterias.			*al. 2003 for implementation of US regulations (107)*
CATCH Kids Club pilot after-school day-care programme - Texas, USA - 16 after-school programmes (n=157 students for all components and n=69 at 4 sites for education only) - 6-month intervention - Targeted children in grades K-2 and K3–5 - Based on social cognitive theory. ***Activities*** (based on CATCH): - Education component (15 lessons of 15–30 minutes each) - Diet and PA component - PA component at least 30 minutes per day	**Promising/insufficient evidence** Food knowledge significantly improved.	**Promising/insufficient evidence** *(moderately effective for PA but not diet)* Large positive effects were seen in PA, but only a marginal improvement in vegetable intake and fruit for lunch.	**Not reported/not measured**	After-school staff received two 4-hour training sessions plus one booster session. A full day staff training is recommended with repeated follow-up throughout the year. This was a small sample size to analyse the educational component, and the classroom component was too complex and lengthy for practical implementation. Children enjoyed less participating in educational activities after school hours, and staff were less confident in implementing these lessons.	*Kelder et al 2005 (111)*

- Snack component (once a week) – preparation of healthy snack foods.				Staff absenteeism and turnover was an issue for programme fidelity.	
Kansas LEAN school intervention - 1 urban and 1 rural community of Kansas, USA - IG=108 and CG=62, both from 2 different schools - 1 year - Targeted fourth and fifth grade children - Aimed at decreasing dietary fat and increasing PA. ***Activities*** - Curriculum/diet education to include healthy diet and PA - PA programme - Change in school lunches to reduce fat - Community partnerships.	**Moderately effective** The percentage of students who answered knowledge, skills and attitude questions correctly or favourably increased significantly.	**Moderately effective** The mean fat content of school meals decreased significantly from 38% to 30%. PA also improved significantly.	**Not reported/not measured**	This intervention has significant cost implications since two dieticians were employed for between 20 and 30 hours per week to assist with food service, PA and staff and teacher training. Changes in school lunch menus did not negatively affect costs or participation.	*Harris et al. 1997 (104)*
Kansas LEAN school intervention, phase II: 5-a-day for better health - 1 urban and 1 rural community of Kansas, USA - 3 elementary schools that had participated in phase I (n=596) - 5 months - Aimed at increasing F&V intake. ***Activities*** - Classroom activities, including F&V tasting - Cafeteria (new recipes, activities and posters)	**Not reported/not measured**	**Promising/insufficient evidence** Project increased student tasting of new F&V.	**Not reported/not measured**	There were no control schools in the study design. The project did not affect the cost of school meal programmes or student participation in the school lunch. The intervention may not have been long enough to show changes.	*Harris et al. 1998 (105)* *Process and intermediate outcome evaluation only.*

- Supermarket (tours and coupons) - Home (brochures, menus, promotional items) - 1 community event.					
Healthy schools - Santiago, Curico and Casablanca, Chile - IG=2141 from 3 schools, CG=945 from 2 schools - 6-month intervention - Targeted fourth to eighth grade children in low socioeconomic schools - Aimed at preventing obesity, increasing PA and improving healthy foods sold at kiosks. ***Activities*** - Curriculum/educational programme to include healthy diet and PA - PA programme/playground activities - Change in foods offered in school shops - School-wide activities - Parental involvement.	**Not reported/not measured**	**Not shown to be effective** (*for diet parameters)* Solid effects on the physical fitness of boys and girls were noted, but no change in the pattern of sales of healthy foods at the kiosks.	**Minimally effective** Adiposity decreased in boys only.	Teachers who provided the intervention received training from a nutritionist and a specialist physical education teacher (one at each school). School tuck shop intervention failed for the lack of incentives to provide healthier choices or regulations to limit availability of “non healthy” foods. The decreased adiposity in boys was most likely due to greater compliance and intensity of PA.	*Kain et al. 2004 (110)*
Gimme 5: a fresh nutrition concept - Louisiana, USA - 12 high schools (IG=6, CG=6, n=2213 at baseline and n=1792 with 4 years of data) - 4-year intervention - Targeted children in grades 9–12 (aged 14–18 years)	**Moderately effective** Significant differences in knowledge and awareness were seen in the IG.	**Moderately effective** F&V consumption significantly increased in the IG from 1994 to 1996. There were no significant differences between the groups in 1997 (as the CG had increased F&V	**Not reported/not measured**	Trained teachers provided the intervention. A unique feature of this programme was that it was planned using data obtained from focus groups of scholars at all participating schools. This provided the planners with a much broader	*Nicklas et al. 1998 (129)* *Nicklas et al. 1997 (130)* *O’Neil & Nicklas 2002 for summary (132)* *Nicklas and*

- Aimed at increasing F&V consumption - Based on principles of the Precede-Procede model. ***Activities*** - Five 55-minute workshops - Change in foods offered in schools meals - Parental involvement - School media-marketing campaign.		intake).		perspective on how to structure the programme. It may be difficult to implement health education programmes in the classroom as they compete with academic requirements for time. Environmental strategies overcome this and reach a larger segment of the population.	*O'Neil 2000 for process evaluation (131)*
Gimme 5 - USA - 16 elementary schools (IG=8, CG=8, n=1172) - One-year intervention - Targeted third and fourth grade children - Aimed at increasing F&V consumption - Based on social cognitive theory. ***Activities*** - Curriculum (6 weeks, 12 sessions per year) - Parental involvement (newsletters, weekly home assignments and videotapes) - Point-of-purchase education at 2 grocery stores per school.	**Moderately effective** Significant effects in the IG in behaviours and knowledge. Some differences for F&V self-efficacy and social norms, but not significant.	**Minimally effective** Intake of F&V and juice together was significantly higher, but not for fruit alone. Positive differences were observed for F&V and juice at weekday lunches.	**Not reported/not measured**	Trained teachers undertook the intervention after receiving a one-day training session. Innovative ideas in daily newsletter for parents and at the closest supermarkets. A low level of curriculum implementation was apparent from classroom observations. This contributed to why the results did not fall in the effective category.	*Baranowski et al. 2000 (69)*
High-5 project (1 of 9 community projects within Five-a-Day for Better Health Initiative) - Alabama, USA - 28 schools (n=1698 families)	**Effective** Significant effects seen in children in self-efficacy and knowledge.	**Effective** There was a significant increase in F&V consumption, fibre, folate, beta-	**Not reported/not measured**	Project coordinators, helped by teachers, implemented the intervention. They also trained food service staff and coordinated parent	*Reynolds et al. 2000 (141)* *Reynolds et al. 2000 for process*

- Targeted fourth to fifth grades, 8–9-year-old children - Aimed at increasing F&V consumption - Based on social cognitive theory. ***Activities*** - Curriculum (14 lessons in fourth grade plus 3 short booster sessions in fifth grade) - Change in foods offered in school cafeterias (training food service staff) - Parental involvement.		carotene and vitamin C in children at year 1 and 2. Parental F&V intake was significant in year 1, but not in year 2.		activities. The programme was effective in most sub-samples, suggesting it may be generalized for different groups. High implementation rates were found in the classrooms, moderate rates were found in family participation.	*evaluation (142)*
Community intervention programme - Rural area of Arkansas, USA - 2 schools (IG=548, CG=382) - Most children were African-Americans from disadvantaged rural communities who were recipients of the free lunch programme - 1 school year intervention - Targeted children in grades 2–5 - Based on social learning theory. ***Activities*** - Diet curriculum - Change in foods offered in school cafeterias - Point-of-purchase messages in cafeteria - Parental involvement (including newsletters) - Community activities.	**Moderately effective** Most of the significant improvements in knowledge were in grades 4–5. No significant changes in knowledge of parents.	**Moderately effective** Significant increases in food choice and behavioural intent seen in grades 4–5 in the IG.	**Not reported/not measured**	Selected teachers were trained to deliver a classroom curriculum. One important consideration was that teachers complained of a heavy workload when the intervention programme was added to their own curricula. This needs to be taken into account when planning this type of programme. Support for the project, in terms of funds for materials and people to assist, were essential for its success.	*Dollahite et al. 1998 (82)*

Five-a-day power plus - Minnesota, USA - 20 schools (IG=10, CG=10, n=1612 completed health behaviour questionnaire, n=441 completed dietary recalls, n=324 parent interviews) - Two 3-month interventions over 2 years - Targeted fourth and fifth grade children where more than 60% qualified for free school lunch - Aimed at increasing F&V consumption - Based on social learning theory. ***Activities*** - Behavioural curriculum (2 curricula each of one 40-minute session, twice a week for 8 weeks) - Change in foods offered in school meals including point-of-purchase promotions - Parental involvement and education - Industry involvement: supplier of F&V provided materials and gave presentations.	**Moderately effective** Several significant improvements from the health behaviour questionnaire.	**Moderately effective** Fruit intake increased at lunch, as well as combined F&V intake. Increased lunch vegetable intake for girls. Increased daily fruit consumption and % E from F&V.	**Not reported/not measured**	Teachers received a one-day training session, and food service staff attended two 2-hour training sessions. Results from the process evaluation showed high levels of participation, dose and fidelity for all components except the parental involvement. This explains why F&V increased most at school and not at home.	*Perry et al. 1998 (136) Story et al.2000 for process evaluation (159)*
TEENS (Teens Eating for Nutrition and Energy at School) - Minnesota, USA - 16 schools (n=3503, IG=1748, CG=1755. For 24-hour recall data, n=455) - 2-year intervention (1 year	**Not reported/not measured**	**Effective** The most significant increase in F&V and decrease in fat intake was in the Group 4 exposure (peer group plus curriculum plus environment	**Not reported/not measured**	Trained teachers and peer leaders presented the intervention to grade 7 children. Peer group training proved the most successful in improving F&V and lowering fat intake. Use of peers may be an effective	*Birnbaum et al. 2002 for first year outcomes (77)*

results) - Targeted children of low-income families in grades 7 and 8 - Aimed at increasing F&V and decreasing fat intake - Based on social cognitive theory. ***Activities*** - 4 incremental exposures: (1) control group, (2) school environment (food service component) only, (3) school environment plus curriculum (and parental component), and (4) school environment plus curriculum plus peer leaders.		components), followed by Group 3 (curriculum plus environment). Peer group leaders reported nearly a full serving increase. A tendency to choose lower fat food also improved significantly in the same 2 groups.		and sustainable way of conducting programmes.	
TEENS (Teens Eating for Nutrition and Energy at School) - Minnesota, USA - 16 schools (survey sample n=2883). For 24-hour recall data n=455, IG=288, CG=167. Parent survey n=526 - 2 years - Targeted children from low income families in grades 7 and 8 - Aimed at increasing F&V and decreasing fat intake. Also increasing offerings and sales of F&V and low-fat foods in the home and school - Based on social cognitive theory. ***Activities*** (1) school environment (food	**Not reported/not measured**	**Minimally effective** No difference in measures of food intake were noted. Positive effects were seen only for food choice scores (suggesting students usually choose lower versus higher fat foods). IG parents reported healthier food choices when grocery shopping. No intervention effects from a home food inventory. IG schools offered and sold a higher proportion of healthy foods *à la*	**Not reported/not measured**	School level environmental strategies involved School Nutrition Advisory Council and school food service. Training was given to school food service staff. The use of peer leaders in seventh grade may have been crucial to the success in year 1. Also why there was a poor response to group projects in eighth grade. Process data suggest incomplete implementation of the intervention, particularly the classroom curriculum and engaging families in intervention activities. Curricula may be more effective if teachers	*Lytle et al.2004 (117)* *Lytle et al. 2006 for school and home environments (116)*

service component) only, (2) school environment plus curriculum (and parental component–newsletters and behavioural coupons), and (3) curriculum including peer component in seventh grade and behaviour modification and group projects in eighth grade.		*carte*. No effects for F&V sales as part of regular meal pattern lunch.		had more training or if delivered by staff specifically trained to do this. However, this would limit feasibility and sustainability.	
Eat well and keep moving - Baltimore, USA - Children: n=479, IG=190 in 6 schools, CG=289 in 8 schools (n=335, IG=173 and CG=162 for 24-hour recall data) - 2 years - Targeted grade 4 and 5 children. 91% African-American - Aimed at improving diet (decreasing fat and saturated fat and increasing F&V), increasing PA and reducing TV viewing - Based on social cognitive theory and behavioural choice theory. ***Activities*** - Classroom curricula (13 lessons/year) - PA - Parental involvement - Interventions linked to the school food service, families, teacher wellness programmes and classroom campaigns.	**Moderately effective** Dietary knowledge was significantly increased by 1.4 points in the IG.	**Effective** Significant decrease in percentage of fat (–1.4%) and of saturated fat (–0.1%). Consumption of F&V increased (equivalent to 0.73 servings/day), vitamin C and fibre. No differences in PA.	**Not reported/not measured**	The programme was integrated into existing school curricula and structures using classroom teachers. Materials integrated into maths, science, language, arts and social studies classes. This makes the programme replicable and sustainable. Teachers attended a one-day training and 2 meetings a year. The high percentage of African-Americans implies that the intervention may benefit disadvantaged communities. Another outcome is that it marginally reduced TV viewing time, which has greater implications for snacking and weight gain. Classroom-based materials were developed to be low in cost and sustainable.	*Gortmaker et al. 1999 (100)*

Healthy Start - 9 centres in New York, USA - Children (n=1296, IG=6 schools, CG=3 schools) - 2 years - Targeted pre-school children aged 2–5 years, most of whom were from low-income, African-American or Hispanic families. - Aimed at decreasing saturated fat content of meals to < 10% E and in decreasing saturated fat intake by pre-schoolers to < 10% The food service intervention was modelled on CATCH. ***Activities*** 2 arms: (1) food service only, and (2) food service plus diet education. - Parental involvement.	**Not reported/not measured**	**Effective** Total fat and saturated fat intake of children decreased significantly after 2 years in the food service IG. School meals followed the same pattern.	**Effective** Total serum cholesterol decreased significantly in the IG in both food service groups (–6.0 versus –0.4 mg/dl), with a 30% reduction in risk of elevated cholesterol.	Chefs received one-day training from dieticians, and teachers were trained to deliver the educational curriculum. The food service component was successful in decreasing dietary fat and blood cholesterol values. Limited time was allocated to the education programme, which may account for the lack of any further benefits.	*Williams et al. 2002 (169)* *Williams et al. 2004 (170)*
Evaluation of a low-fat milk programme - New York, USA - 6 elementary schools (IG=3, CG=3) in the inner city, mainly Latino neighbourhoods (n=5417) - 7–10 days - Aimed at increasing consumption of 1% fat milk rather than full cream milk - Based on the Precede-Proceed framework. ***Activities*** - Social marketing techniques, including product positioning, celebrity endorsement, taste	**Not reported/not measured**	**Effective** Low-fat milk consumption increased from 25% to 57% and remained significant after 3 months. There was no overall decrease in milk consumption.	**Not reported/not measured**	The focus of this study was on one specific eating behaviour. Culturally appropriate role models were used. Food service staff made displays and encouraged consumption of 1% milk. Packaging may affect product choice. Effect of intervention on overall fat or calorie intake is not known. The intervention did not interfere with classroom time. This is a quick and effective way to decrease saturated fat intake in a	*Wechsler et al. 1998 (167)*

tests, advertising, point-of-purchase incentives, a slogan and entertainment activities.				large group of children.	
Fruit and Vegetables Make the Marks (FVMM) - Norway - Children (n=369, IG=9 schools, CG=10 schools) - 1 school year - Targeted grade 6 and 7 schoolchildren - Aimed at increasing F&V consumption in children - Based on social cognitive theory. ***Activities*** - Encouraged participation in paid F&V subscription - Home economics curriculum - Parental involvement.	**Promising/insufficient evidence** Greater awareness of the five-a-day recommendation was reported.	**Not shown to be effective** No effect was seen in F&V eaten at school or elsewhere.	**Not reported/not measured**	The intervention had no effect on the F&V intake of children. This may be because the intervention did not change the pupils' preferences for, or access to F&V, the 2 strongest correlates of children's F&V intake. May require a stronger parental component.	*Bere et al. 2006 (73) Bere and Klepp 2004 qualitative study (74)*
Norwegian school fruit programme (paid versus no-cost) - Norway - n=795 (IG free F&V, n=222 at 9 schools, subscription group, n=157 at 9 schools, no F&V, n=416 at 20 schools - 1 school year - Targeted grade 7 children, aged 11–12 years - Aimed at increasing F&V consumption in children. ***Activities*** (1) Free F&V in schools, (2) paid	**Not reported/not measured**	**Moderately effective** Pupils attending the free F&V schools had a significantly higher F&V intake. They also had a lower intake of soda/candy/chips than the no F&V group for pupils whose parents had low education levels.	**Not reported/not measured**	Providing free fruit is a strategy to increase consumption in seventh graders (11–12 years). However, cost implications may be considerable. F&V interventions can have a positive effect on the consumption of unhealthy snacks, particularly among subgroups that tend to be hard to reach with educational measures.	*Bere et al. 2005 (75)*

F&V in schools (subscription), and (3) no F&V in schools.

Norwegian school fruit programme at no cost and Fruit and Vegetables Make the Marks (FVMM) - Norway - n=517 (IG=9 schools, CG=10 schools) - 1 school year - Targeted sixth grade children - Aimed to increase F&V intake. ***Activities*** - Free F&V subscription - FVMM educational programme - Second year option for paid F&V subscription (4 out of 9 IG schools participated).	**Not reported/not measured**	**Moderately effective** The intervention was effective for F&V intake at school and over a whole day. Sustained effect at one year post-intervention for all day F&V intake.	**Not reported/not measured**	Sustained effect can be partly explained by greater participation rates in the school fruit programme (paid subscriptions). Effects may be due to the no-cost subscription and not to the educational programme.	*Bere et al. 2006 (76)*
5-a-day power play! campaign - California, USA - 49 schools (n=2684) - One-year intervention - Targeted fourth and fifth grade children - Aimed at increasing F&V consumption in children - Based on resilience theory from social learning theory. ***Activities*** - 2 arms: (1) group/curriculum in the form of activities in the school environment, and (2) group/ curriculum as above plus community activities.	**Moderately effective** Both interventions showed significant increases in the students' belief that they should eat 5 or more F&V/day. Greater effects were seen in the second arm. Both IGs had significant outcomes compared with the CG.	**Moderately effective** Children from the first intervention arm increased consumption of F&V by 7% and those from the second arm by 14%. Both IGs consumed much more F&V than the CG.	**Not reported/not measured**	Teachers were trained to conduct 10 of the 14 core activities. The most significant effects were seen in the second arm, indicating that the campaign was most successful when other channels, such as markets, supermarkets, media and youth groups in the community, worked with the schools.	*Foerster et al.1998 (91)*

Got 5? Nutrition for kids programme - USA - 1 school (n=54) - 10-week intervention - Targeted first and second grade children, aged 7–8 years - Aimed at increasing F&V intake. ***Activities*** - Five 1-hour lessons - Completion of four 2-week calendars noting (self-monitoring) all F&V eaten daily. Parents were required to initial the calendars on a daily basis - Incentives were offered for completion of calendars - Used as a goal-setting procedure to promote dietary change.	**Promising/insufficient evidence** The majority of parents indicated that the calendars made children more aware of eating practices.	**Promising/insufficient evidence** More children consumed 4 or more F&V from calendar 1–4. Data from parents showed a significant increase in fruit intake after the programme.	**Not reported/not measured**	Lessons were taught by a dietician. This was an innovative use of calendars to make children more aware of their F&V intake on a daily basis. Parents reviewed the calendar daily so they were also involved. Small rewards were given for improvements. The calendars were suitable for monitoring F&V intake in children as young as 7 years and added value since they reinforced writing and spelling skills. This simple cost-effective tool needs to be tested in a larger group.	*Kuczmarski et al. 2003 (113)*
PATH (Physical Activity and Teenage Health) programme - New York, USA - An inner-city public school (IG=181, CG=165 children) - 11 weeks - Targeted ninth and tenth grade teenagers from disadvantaged communities (also included some eleventh and twelfth grade students) - Aimed at reducing coronary heart disease risk factors. Diet focus was on reducing saturated fat, cholesterol, salt and sugar intake.	**Moderately effective** A significant improvement was made in health knowledge in boys and girls. No differences in health attitude scores.	**Moderately effective** Significant improvements were seen in dietary habits (decreased intake of foods high in saturated fat, cholesterol, salt and sugar) and in VO2 max (in girls only).	**Minimally effective** Significant decrease in total cholesterol values in girls only. No differences in blood pressure or BMI.	Trained physical education teachers and students from a local college provided the PA programme and the lecture materials. 5- minute lectures were immediately followed by the exercises. Girls had lower baseline VO2 max and higher baseline cholesterol levels than boys.	*Fardy et al. 1996 (88)*

Activities
- Curriculum: health promotion classes of 30 minutes, 5 times/week over 11 weeks
- PA programme (circuit training)
- 20–25 minutes PA followed by 5 minutes health promotion on diet, PA, stress, smoking
- Students also received manuals.

PATH (Physical Activity and Teenage Health) programme - New York, USA - Girls in 3 high schools (IG=310, CG=132) - 12 weeks, evaluated at 2 years - Targeted 14–19-year-old girls, mainly students from disadvantaged communities - Aimed at reducing coronary heart disease risk factors. Diet focus was on reducing saturated fat, cholesterol, salt and sugar intake. ***Activities*** - Curriculum: health promotion classes of 30 minutes, 5 times/week over 12 weeks emphasizing heart health and cardiovascular fitness - PA programme (alternating circuit training and aerobic exercise) - 5–10 minute lecture followed by 20–25 minutes vigorous PA.	**Moderately effective** A significant improvement was noted in heart health knowledge.	**Minimally effective** Significant differences were reported in the content of breakfast. A slightly greater improvement was made in dietary habits and out-of-school PA, but this was not significant.	**Minimally effective** Significant decrease in percentage body fat and blood pressure. No significant differences in BMI, total cholesterol or VO2 max.	Trained physical education teachers taught the curriculum. Experimental and control participants were at the same school and this may have influenced outcomes.	*Bayne-Smith et al.2004 (71)*

Cardiovascular Health in Children - North Carolina, USA - 18 schools - 8 weeks - Targeted children in third and fourth grades - Aimed at reducing CVD risk factors in elementary school children - IG1: classroom-based intervention, IG2: risk-based intervention in small groups, CG: usual teaching and PA. ***Activities*** - Curriculum on diet, PA and smoking (twice a week for 8 weeks) - PA programme (3 times a week).	**Moderately effective** Significantly greater knowledge in the IG. Significant increase in knowledge in both IGs. Total knowledge greater in the classroom IG.	**Moderately effective** Significant increase in self-reported PA in the IGs. No difference in eating a high-fat diet.	**Moderately effective** Differences were not statistically significant at school level for cholesterol and blood pressure but were clinically meaningful. Trends found in the IG were a reduction in total blood cholesterol, reduction in body fat and a smaller increase in blood pressure than in the CG.	Trained teachers provided the intervention. This was a practical intervention since it was built on programmes readily available to schools and did not require additional teachers or expensive materials to deliver the classroom component. A qualified physical education teacher could teach the PA component. The intervention targeted all children and not just those 'at-risk', which avoids labelling, misclassification and screening costs. The long-term outcomes are not known.	*Harrell et al. 1996 (101)* *Harrell et al. 1998 (102)* *Harrell et al. 1999 (103)*
Students and parents actively involved in being fit after-school programme - Detroit, USA - Parents (n=25) and children (n=56) - 12 weeks - Targeted African-American children and parents at an urban middle school - Aimed at increasing F&V intake and physical fitness. ***Activities*** - one 60–75 minute session, 4 days/week - PA programme	**Not reported/not measured**	**Promising/insufficient evidence** Significant increase in fruit consumption took place in children and parents. Improvement in intake of salads, fruit juice and non-fried potatoes in children.	**Insufficient evidence /promising** Diastolic blood pressure was reduced in children and parents. Systolic blood pressure also improved in children. Improved body fat, BMI and endurance in parents.	There was no CG in the study design. Overall findings showed that children tended to gain more dietary benefits while parents gained more PA benefits.	*Engels et al. 2005 (85)*

- Diet learning activities
- Information distribution.

Internet and video intervention - Midwest, USA - 2 urban middle schools (IG=67, CG=63) - 4 sessions - Targeted middle school students from minority groups - Aimed at decreasing fat in the diet and improving PA - Based on concepts from the health promotion/transtheoretical model. ***Activities*** - 4 Internet and video sessions plus a healthy snack session (peer led), gym classes (1 school, six 50-minute peer-led sessions).	**Not reported/not measured**	**Minimally effective** Fat in the diet decreased with each Internet session. Girls in the IG decreased diet fat versus CG in all minority groups but one. Boys had a greater decrease in fat in the CG. % E from fat was not significantly different between groups as a whole. The target of < 30% E from fat was not reached. Those with gym sessions increased their PA compared to a decrease in the Internet group and the CG.	**Not reported/not measured**	An innovative study using 4 Internet sessions plus a healthy snack session and gym classes. However, the longer term effects are unknown. There was no significant difference in intervention effectiveness whether or not a food laboratory was included. This intervention is time, personnel and resource intensive. Nursing students assisted with peer-led gym classes, increasing personnel costs.	*Frenn et al. 2003 (95)*
Changing the tide: internet and video intervention - Midwest, USA - 1 middle school (n=103) - 8 sessions over 1 month - Aimed at reducing dietary fat and increasing PA - Targeted seventh grade middle school students from low-income families - Based on health promotion/ transtheoretical model.	**Not reported/not measured**	**Moderately effective** Those who completed more than half of the sessions increased PA and decreased % E from fat (0.8%).	**Not reported/not measured**		*Frenn et al. 2005 (96)*

Activities - 8 Internet sessions with four 2–3-minute videos in science class computer laboratory - Computer-generated, tailored feedback provided on PA and dietary fat.					
Squires Quest - Houston, Texas, USA - 26 primary schools (n=1578, IG=749, CG=740) - 5 weeks - Targeted fourth grade, 8–12-year-old children - Aimed at increasing F&V intake in children - Based on social cognitive theory. ***Activities*** - 10 sessions of an interactive multimedia game called Squires Quest - Goals related to F&V intake are set at the end of every session.	**Not reported/not measured**	**Effective** Children participating in the Squires Quest significantly increased their F&V intake by one serving more than the CG.	**Not reported/not measured**	A psycho-educational game for children in a multi-ethnic environment. The development of such games is fairly expensive and sufficient resources are required to use this as an educational tool. This intervention may not be appropriate in low- and middle-income countries.	*Cullen et al. 2005 75 Baranowski et al. 2003 (67) Cullen et al. 2004 for goals (80)*
Five-a-day cafeteria power plus intervention - Minnesota, USA - 26 schools (IG=13, CG=13, n=1168) - 2 years - Targeted children in first and third grade in year 1, and in second and fourth grade in year 2 - Majority non-Caucasian - Aimed at increasing F&V	**Not reported/not measured**	**Moderately effective** Fruit intake increased significantly but portion sizes were small (0.17 serving increase).	**Not reported/not measured**	The intervention provided positive role models, additional opportunities and increased social support to increase F&V intake. Food service staff were trained to provide access and support to children in the selection of F&V. There was an association between verbal encouragement by food service staff and F&V	*Perry et al. 2004 (137)*

consumption at lunch in the school cafeteria - Based on social cognitive theory and a health behaviour planning model. ***Activities*** - Daily activities around food service to increase availability, attractiveness and encouragement for F&V - Special events.				intake. One-day training sessions took place for all food service staff and monthly manager meetings. Intervention staff visited schools weekly. Authors recommend multi-component programmes with classroom curricula and parental involvement rather than cafeteria programmes alone.	
Integrated Nutrition Project - Colorado, USA - 3 public schools, IG=226, CG=218 (plate waste data); IG=295, CG=248 (survey data) - 24 weeks - Targeted primary-school children (most grades 3–5) from disadvantaged communities, majority Hispanic (over 80% received free lunch programme) - Aimed at increasing F&V and grain intake, knowledge and attitudes to F&V, knowledge of the food pyramid and food preparation skills - Based on behaviour change theory, social cognitive theory and Piaget's cognitive development theory. ***Activities*** - Curriculum: 24 weekly 45–60 minute classroom activities including food preparation and eating	**Moderately effective** Greater gains were made in knowledge and self-efficacy regarding diet objectives.	**Moderately effective** Children consumed 0.4 more servings of F&V per lunch.	**Not reported/not measured**	The intervention was carried out by a specialist resource teacher in consultation with a dietician. Teacher training: 3 after-school sessions and weekly classroom role modelling from theresource teacher, who alleviated time constraints on classroom teachers and improved implementation and fidelity of the programme. Classroom activities were designed to reinforce concepts in maths, science, literacy and social studies. Focus on "eat more of" messages rather than "don't eat" messages. This is an effective programme in terms of knowledge and behaviour change. However, the appointment of a resource schoolteacher makes it more expensive to	*Auld et al. 1998 (66)*

- Parental involvement (newsletters, diet classes, fun nights) in year 4; 6 parent-taught lunch-time activities - Community diet/resource development.				run the intervention in all schools. Parent and community outcomes were not included in the results of this paper.	
Bienestar (well-being) health programme: Diabetes risk-factor prevention pilot - San Antonio, USA - Children (n=102) - 1 school year (7 months) - Targeted fourth grade Mexican-American children from low-income families. All were overweight, had a high-fat diet and a family history of diabetes - Aimed at decreasing body fat and dietary fat intake - Based on social cognitive theory. ***Activities*** - Health curriculum: 28 lessons - School cafeteria component - Parent health education - Health club: after-school activities.	**Promising/insufficient evidence** Health knowledge increased. The high attendance group (at health club) had significantly higher health knowledge scores than the lower attendance group.	**Promising/insufficient evidence** Fat servings and % E from fat decreased, while F&V intake increased.	**Not reported/not measured**	There was no CG in the study design. Parent education included a dietetic consultation to discuss the child's diet. Culturally relevant educational material was used. Classroom curricula alone may not produce favourable results. Need to involve parents and external social systems.	*Trevino et al. 1998 (161)*
Bienestar diabetes mellitus prevention pilot - San Antonio, USA - 13 intervention and 14 control schools, IG=619, CG=602 - Targeted fourth grade Mexican-American (80%) children from low-income (94%) families	**Not reported/not measured**	**Minimally effective** Fitness scores and dietary fibre increased (1 g/day). No difference in % E from dietary saturated fat intake.	**Moderately effective** Decreased fasting glucose levels in IG (–0.12 mmol/l). No difference in percentage body fat.	On average, students attended 32 of 50 sessions. The positive results are thought to be the outcome of culturally appropriate material, multiple systems of delivery and frequency of contacts. It is unknown	*Trevino et al. 2004 (162)*

- 7 months - Aimed at decreasing saturated fat and increasing dietary fibre and PA - Based on social cognitive theory and socio-ecological theory. ***Activities*** - 50 health sessions: health class and PA curriculum (1 day health education and 4 days PA programme) - A family programme - A school cafeteria programme - An after-school club (1 hour a week) - Incentives offered - Culturally relevant material.				whether outcomes will be sustained over time.	
Nutrition Education at Primary School - Galway, Ireland - 8 intervention schools and 3 control schools (n=525, n=187 completed food diaries) - 10-week intervention - Targeted third and fourth grade, 8–10-year-old primary-school children. ***Activities*** - Education programme (20 sessions of 30 minutes), worksheets, homework assignments to involve parents - An aerobic exercise regime.	**Not shown to be effective** No difference was perceived in knowledge, although knowledge levels were very high at baseline.	**Minimally effective** F&V intake increased (number consuming 4 or more servings per day). Children also consumed less salty snacks. Increased behaviour and preference scores in the IG.	**Not reported/not measured**	Participating teachers received in-service training. The benefits of the intervention were seen mainly in children in schools in advantaged areas.	*Friel et al. 1999 (97)*
Sandy lake diabetes	**Insufficient**	**Insufficient**	**Insufficient**	There was no CG pre- or	*Saksvig et al.*

prevention programme - Sandy Lake, Native North American Reserve, Canada - Children (n=122) Ojibway-Cree (Native Americans) - 1 school year - Targeted third, fourth and fifth grade students, aged 7–14-years - Ecological model and social cognitive theory. ***Activities*** - Curriculum: one 45-minute lesson for 16 weeks - Family component - Information distribution and radio use - Peer component: cooking club and radio show - Environmental component: policy banning high sugar, high-fat snack foods - School breakfast snack programme.	**evidence/ promising** Intervention exposure was associated with being in the highest category for knowledge of foods low in fat and for dietary self-efficacy. Not associated with dietary intent.	**evidence/ promising** Intervention exposure was associated with having met > 5 g dietary fibre intake/day. There was a decrease in % E from fat, but this was not associated with the exposure.	**evidence/not likely to be effective** BMI increased. Students obese at baseline had a greater change in weight.	post-test, nor a strong PA component. The curriculum was based primarily on the CATCH and Kahnawake Schools Diabetes prevention model. Findings suggest that the intervention affected the home, in addition to the school environment. The cost of the programme and burden to teachers are low when sponsorship or funding for the school breakfast is available. The greatest cost is funding a programme coordinator.	*2005 (148)*
Zuni high school diabetes prevention programme - New Mexico, USA - IG=72 Zuni; CG=37 Anglo - Targeted 16–18-year-olds - Cross sectional design at 1.5 and 3 years - Aimed at decreasing consumption of sugared beverages. ***Activities*** - Education component on diabetes prevention	**Not reported/not measured**	**Promising/insufficient evidence** The consumption of sugared soft drinks decreased by about 4.8 ounces per day per student. Soft drinks were replaced by water and diet drinks. Use of the fitness centre increased over the 3 years.	**Promising/insufficient evidence** Baseline fasting and 30-minute plasma insulin levels were elevated in the IG at the start of the intervention and showed significant declines over the study period. By year 3, fasting	Funds were provided to remodel a school room into a fitness centre, which was run by certified fitness instructors.	*Ritenbaugh et al. 2003 (144)*

- Youth oriented fitness centre - Environmental component (availability of water and diet beverages) - School food service (increased F&V and decreased fat in school lunches) - Mass media including posters and the radio.			insulin was not different to the CG. 30-minute insulin in males was no different in CG. Fasting glucose levels varied little over the 3 years with most in the normal range.		
Trying Alternative Cafeteria Options in Schools (TACOS) - Minneapolis, USA - Children (IG=10, CG=10 secondary schools) - 2 years - Aimed at increasing sales of low-fat foods in secondary school cafeterias. ***Activities*** - Increased availability of lower fat foods (5 g fat or less) - Student-based promotions of these lower fat foods (financial incentives offered to students).	**Moderately effective** Students perceived greater availability of, and greater normative support for lower fat choices.	**Moderately effective** Steeper rate of increase in the sale of lower fat foods in year 1 and a higher percentage of sales of lower fat foods in year 2. No significant effect on food service revenues. No changes in student self-reported food choices.	**Not reported/not measured**	Quarterly meetings took place between research and food service staff. Student groups implemented school-wide promotions after training by programme staff, who liaised between students and food service staff. School environmental changes can produce positive effects on food choices without a supportive curriculum or home-based family component. Involving students in promotional activities can foster positive peer norms.	*French et al. 2004 (92)* *French et al. 2005 (93)*
Kahnawake schools diabetes prevention project - Mohawk community in Quebec, Canada - Children (IG=458, CG=199 school children). Variable numbers for community activities - 8 years repeated cross-	**Not reported/not measured**	**Minimally effective** Longitudinal data showed no effect on PA, fitness or diet. Cross-sectional data showed a decrease in the intake of high-fat and sugar foods as	**Minimally effective** Longitudinal data showed early positive effects of the programme on skinfold thickness but not on BMI.	This participatory approach emphasized community ownership and community decision-making. The curriculum and diet policy was implemented to varying degrees. The curriculum was delivered by a dietician	*Paradis et al. 2005 (134)* *Jimenez et al. 2003 (109)* *Macaulay et al. 1997 (119)*

sectional measurements in intervention community. 2-year longitudinal data of intervention and comparison community - Targeted elementary school children in grades 1–6, aged 6–11 years - Aimed at decreasing obesity and high-fat and high-calorie diets, and increasing PA - Based on a combination of social learning theory, the Precede-Proceed model, the Ottawa Charter and traditional learning styles of native children. ***Activities*** - Health education curriculum: 10 lessons of 45 minutes per year per grade - Community activities and collaboration with community organizations, including the creation of a community advisory board - Mass media - Environmental and policy changes including ban of junk food sold at schools and a walking/cycling path in the community.		well as a decrease in F&V intake. PA, fitness and TV watching showed favourable trends for 5 years but were not sustained at 8 years.	Repeated cross-sectional measures showed increases in BMI and skinfold thickness.	and community health nurses in the first year. Teachers were trained and from year 3 were delivering the programme. Possible reasons for failure to reduce prevalence of obesity include the introduction of satellite TV, increased availability of fast-food restaurants, increased proportion of families where both parents work, TV advertising, perceived importance of computer literacy and decreases in PA classes due to education budget cuts. Also secular increases in body fat.	
Be smart - Oxford, United Kingdom - 3 primary schools (n=181 children) - 20 weeks (4 school terms) - Targeted grades 1 and 2, aged	**Promising/insufficient evidence** Knowledge improved significantly in all groups, but even	**Insufficient evidence/not likely to be effective** Changes were seen in fruit consumption in the diet group and the	**Insufficient evidence/not likely to be effective** No significant changes in rates	This intervention is relatively expensive and may be unsustainable. The promotion of healthy lifestyles requires replication in other social settings in	*Warren et al. 2003 (165)*

5–7 years - Aimed at preventing obesity - Based on social learning theory. ***Activities*** - 1 of 3 groups in a 'lunchtime club' setting: (1) diet curriculum "Eat Smart', (2) PA curriculum 'Play Smart', (3) diet and PA group curriculum 'Eat Smart Play Smart'.	more so in the diet and combined group.	CG in particular. No significant changes in consumption of confectionary or crisps in any group.	of overweight and obesity.	addition to schools. The lack of positive outcomes may be due to possible contamination between groups. Randomization by school may be advantageous.	
Fruit and vegetable subscription - Denmark - 7 primary schools (IG=4, n=240; CG=3, n=205) - 5 weeks - Targeted grades 0–3; children aged 6–10 years - Aimed at increasing F&V intake. ***Activities*** - F&V subscription of 1 piece per child per day.	**Not reported/not measured**	**Moderately effective** At intervention schools, both subscribers and non-subscribers increased intake of fruit (0.4 and 0.3 pieces) per child per day, but not vegetable intake. No change in intake at control schools.	**Not reported/not measured**	A third of the cost of the subscription was subsidized, with parents paying the rest. The study had a 31% response rate, and also appeared to have carry-over effects to children at the intervention school who did not subscribe. Parents may have been motivated to supply children with fruit as a result of hearing about the subscription. A simple and cost-efficient intervention.	*Eriksen et al. 2003 (86)*
Two school interventions on knowledge and consumption of fish - Gothenburg, Sweden - 3 intervention schools and 1 control school (n=228, CG=83, IG1=58; IG2=87) - 1 school year - Targeted eighth grade adolescents - Aimed at increasing knowledge	**Moderately effective** Knowledge improved in both IGs.	**Moderately effective** Consumption of fish increased in both IGs compared with the CG.	**Not reported/not measured**		*Prell et al. 2005 (139)*

and consumption of fish - Theory of planned behaviour. ***Activities*** - 2 arms: (1) school lunch, changes in school canteen and (2) school lunch and home economics, with an adapted home economics syllabus.					
Girl guide camp as a setting for a nutrition education programme - Queensland, Australia - Children (n=1600 attending camp, sample of n=275 for evaluation) - 7-day intervention - Targeted girls aged 9–15 years - Aimed at increasing healthy food choices. ***Activities*** - Provision of healthy foods based on Australian Dietary Guidelines and diet education materials for use at camp restaurant in the evening.	**Promising/insufficient evidence** 77% felt they had learnt something from the educational material.	**Promising/insufficient evidence** 94% said they had changed their eating habits to include more core food groups during the camp. Over 40% had increased their vegetable consumption.	**Not reported/not measured**	It is unclear if there would be any long-term behavioural changes outside the camp environment. Leaders appeared to influence the girls' willingness to try new foods. Including leaders in the development of the programme and providing diet training are needed to obtain their support during implementation. Inclusion of diet education activities into a daily camp schedule is also recommended.	*Payne et al. 2002 (135)*
The middle school physical activity and nutrition study - California, USA - Children at 24 middle schools (n=1109) - 2 years - Targeted grades 6–8 - Aimed at decreasing fat purchased at/or brought to school plus increasing PA	**Not reported/not measured**	**Not shown to be effective for diet. Minimally effective for PA** There was no reduction in high-fat purchases at/or brought to school. Intervention effect for PA for boys but not for	**Minimally effective** Significant reduction in self-reported BMI among intervention boys but no effect for girls.	There was no evidence of improved behaviours outside of school. Reticence was seen within schools to reducing the availability of popular high fat foods, for financial reasons. Guidelines for food service staff to reduce fat in dishes were insufficiently	*Sallis et al. 2003 (149)*

- Based on structural ecological model. ***Activities*** - PA: to increase PA in physical education classes and throughout the school day - Diet: to provide and market low-fat foods at all school sources such as cafeteria - Policy changes: 2–4 health policy meetings per year between project staff and school personnel - Student health committees - Parental education - School incentives.		girls.		implemented.	
FACETS-Cancer risk reduction curriculum - USA, north-east - Children at 8 native American sites (5 sites for knowledge data and 1 site for dietary intake data. Tobacco use data from 4 sites, IG=86, CG=31) - 4 months - Targeted native American youth grades 4–6; aged 10–12 years - Aimed at reducing cancer risk through prevention of tobacco use and diet modification. ***Activities*** - 3 arms: (1) tobacco curriculum, (2) dietary modification curriculum, and (3) combined tobacco and diet curriculum - All arms had 15 weekly	**Promising/insufficient evidence** Improved dietary knowledge in diet arm and the combined intervention. Improved knowledge regarding tobacco in the tobacco only and combined interventions.	**Promising/insufficient evidence** The diet arm reported a decrease in fat intake from 41.1% to 36.6%, and an increase in complex carbohydrates. Tobacco use decreased in the tobacco and combined interventions.	**Not reported/not measured**	There was no CG in the study design. The curriculum was culturally sensitive and trained native Americans delivered the intervention. Collaborative design of intervention.	*Schinke et al. 1996 (151)*

sessions of 90 minutes.

Family fitness programme - California, USA - Children (n=238) from 6 elementary schools (IG=142, CG=96) - 20 weeks - Targeted third grade - Aimed at modifying CVD risk behaviours. ***Activities*** - Diet (two 30-minute lessons/week) and PA (three 30-minute lessons/week) - Parent programme: guided home activities.	**Minimally effective** PA and diet knowledge was significantly higher in the IG, but this change did not persist at follow-up.	**Moderately effective** Significantly lower total fat intake (from 59.67 g to 57.05 g).	**Not shown to be effective** No improvement in cholesterol, BMI or skinfolds.	Teachers were trained to administer the intervention. Consistent programmes emphasizing PA and diet may be necessary throughout the grades to solidify behavioural changes.	*Hopper et al. 2005 (108,258)*
Stage based interventions for low-fat diet - USA - Children (IG=60, CG=57) middle school; low- to middle-income - 4 sessions - Targeted sixth to eighth grade - Aimed at decreasing fat and increasing PA - Based on health promotion and transtheoretical model. ***Activities*** - Stage of change classroom intervention. Four 45-minute sessions.	**Not reported/not measured**	**Promising/insufficient evidence** Post-test percentage fat in food was significantly less for the IG as compared with the CG. Increased duration of PA.	**Not reported/not measured**	Only 4 sessions were possible, as class time needed for other curricular content.	*Frenn et al. 2003 (95)*
After-school nutrition intervention - USA	**Insufficient evidence/not likely to be**	**Insufficient evidence/not likely to be effective**	**Not reported/not measured**	There was no CG. Researchers taught the lessons. The lack of	*Rinderknecht and Smith 2004 (143)*

- Native American children (n=104, 65 children and 39 adolescents) - 7 months - Targeted children aged 5–10 and adolescents 11–18 years - Aimed at improving self-efficacy in children and adolescents and in decreasing fat and sugar intake in adolescents - Based on social cognitive theory. ***Activities*** - New diet component in after-school programme. One 30–60 minute monthly lesson and activities for each age group - Dinner menus modified to be lower in fat and higher in F&V.	**effective** Significantly improved self-efficacy was noted in overweight children. Not successful with adolescents.	Increase in fat and sugar consumption in adolescents.		intervention effect among adolescents reiterates the need for greater comprehension of personal, environmental, and behavioral constraints, influencing dietary self-efficacy and behavior.	
An environmental change strategy to increase healthful selections - Texas, USA - Children at 2 elementary schools (IG=571, CG=727), large minority population - 2 school semesters - Targeted kindergarten to fifth grade - Aimed at increasing selection of low- and moderate-fat entrees at school. ***Activities*** - Phase 1: 1 of 3 entree choices was low or moderate in fat - Phase 2: 2 of 3 entrée choices	**Not reported/not measured**	**Moderately effective** <u>Phase 1</u>: no increase in rate of selection of low- or moderate-fat entrees. <u>Phase 2</u>: both low- and moderate-fat entrees were selected at a higher rate in the IG compared with the CG.	**Not reported/not measured**	Increasing the availability of low- and moderate-fat entrees will only increase their rate of selection if the availability of high-fat options is reduced. The study did not reduce participation rates. Easily adoptable, minimal intervention. Food service directors minimized barriers to participation by selecting foods already on the menu and hence complying with the cost structure.	*Bartholomew and Jowers 2006 (70)*

were low or moderate in fat.

Technology to promote self-efficacy for healthy eating in adolescents - USA - Children at 2 junior high schools - One-month intervention ***Activities*** - 5 hours of web-based instruction and 10 hours classroom curriculum. Compared to diet education in standard school curriculum.	**Moderately effective** IG had significantly higher scores for self-efficacy for F&V and lower fat. Scores for dietary knowledge of fat were also higher.	**Minimally effective** No difference between IG and CG in food consumption.	**Not reported/not measured**	Intervention tailored to social and developmental preferences of adolescents.	*Long and Stevens 2004 (114)*
Creating health-promoting schools in China - Zhejiang province, China - Children and adults at 3 primary and 3 secondary schools (n=2389 primary students, n=3346 secondary students, n=679 school personnel, n=1158 parents) - One-and-a-half year intervention - Targeted students, parents and school personnel. Grades 3, 4 and 5 of primary schools and grades 1 and 2 of secondary schools - Aimed at prevention of under- and over-nutrition. ***Activities*** - Diet education (once every 2 weeks), activities and materials - School-wide health promotion	**Moderately effective** Diet knowledge and attitudes improved in primary and secondary students, school staff and parents.	**Moderately effective** Diet behaviour around school lunches and personal hygiene habits improved in primary and secondary school students.	**Not reported/not measured**	Working groups planned, initiated and coordinated the projects. Training was provided to school staff. Talks with target groups also led to improvements to school facilities and health services, establishment of school policies and a positive school climate. Coordinated approach including the school, parents and the community.	*Shi-Chang et al. 2004 (153)*

- Outreach to families and communities - Use of school-based working groups and diet training for school staff.					
Healthy people 2000 - USA - Targeted tenth grade (n=54), multi-ethnic students. ***Activities*** - 10-week health promotion curriculum of classroom education in PA, diet, smoking, stress management and problem solving - Exercise programme.	**Moderately effective** Cardiovascular health knowledge improved.	**Moderately effective** Dietary habits improved.	**Moderately effective** Significant treatment effect in lowered total cholesterol.		*Fardy et al. 1995 (87)*
Nutrition education intervention - Dundee, United Kingdom - Children (n=135, IG=69, CG=66 for cognitive assessments; n=129, IG=64, CG=65 for dietary intake variables, IG=2 schools, CG=2 schools) - 9 months - Targeted children aged 6–7 and 10–11 years - Aimed at increasing consumption of F&V. ***Activities*** - Diet education via curriculum - Increased provision of F&V at schools - Tasting opportunities	**Moderately effective** The IG reported (a) a greater knowledge score of healthier options, (b) greater perceived social pressure scores, (c) decreased preference for high-fat, high sugar foods and drinks.	**Moderately effective** There was a greater increase in fruit intake in the IG than the CG (> 50 g versus > 7 g). No significant change in vegetable intake.	**Not reported/not measured**	A whole school approach effected modest but significant increases in F&V intake.	*Anderson et al. 2005 (65)*

- Point-of-purchase marketing materials
- Newsletters for children and parents
- Teacher information sessions.

School settings (physical activity)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
CATCH - California, Louisiana, Texas and Minnesota, USA - Comprehensive multi-component school-based intervention to prevent or reduce risk factors for CVD - 96 schools across 4 study sites - Spanning grades 3–5, and including more than 6000 students (per-post measurements). ***Activities*** - An "Eat Smart" component targeting food service, physical education (to increase PA during class), health education curriculum, and a tobacco policy - School-based family intervention incorporating "Family Fun Night" and activity cards.	**Moderately effective** Dose effects were found for knowledge and attitudes, more pronounced for ethnic minority and male students.	**Effective** More moderate to vigorous, and vigorous activity than controls; classroom teachers increased lesson length and time for physical fitness; physical education specialists gave longer lessons and more PA. Over 90% completion of session-specific activities. Generally, close to 65% participated in Family Fun Night activities. More than 70% of pupils returned at least one home activity card with more than 30% completing them all.	**Insufficient evidence/not likely to be effective**	One of the seminal models of school-based interventions has demonstrated marginal success at becoming institutionalized within schools.	*Osganian et al., (133)* *Nader et al., (125)* *McKenzie et al., 2001 (124)* *Kelder et al., 2002 (112)* *Hoelscher et al., 2004 (106)*

Planet health ("Eat well and keep moving") - Boston metropolitan area, USA - Comprehensive multi-component, low-cost and sustainable classroom curriculum intervention integrated into existing school infrastructure - Involved 10 (5 IG and 5 CG) middle schools in 4 communities, grades 6–8 - Schools determined which clusters and teachers would implement - n=835 (1999–2000), n=895 (2000–2001) and n=1045 (2001–2002) - Based on components of behavioural choice theory, social-cognitive theory, and constructivist learning theory. ***Activities*** - Aimed to (1) decrease intake of high-fat foods, (2) increase F&V intake, (3) reduce TV viewing, and (4) increase PA - Integrated into 32 classroom lessons in other major subjects, including maths, social studies, science and languages - Incorporated behavioural	**Moderately effective** Increased knowledge of curriculum-related messages. Teachers reported the programme to be feasible and acceptable, and the majority indicated that they would continue to use the curriculum in future.	**Moderately effective** TV viewing marginally decreased by an average 30 minutes per day, but $P < 0.06$. In girls, reduced TV viewing was significantly associated with reduced obesity prevalence ($P < 0.02$).	**Effective** Prevalence of obesity in girls in IG schools decreased from 23.6% to 20.4% from 1995 to 1997, but increased in CG schools.	Using existing school infrastructure ensures sustainability of such programmes. Economic modelling of Quality-Adjusted Life Years (QALYs) saved suggests that this intervention (at a cost of US$ 14/student/ year) can prevent 1.9% of young girls from becoming overweight adults, and translates to a net saving of US$ 7313 to society for a cost of US$ 4305 per QALY saved. Despite perceived barriers, such as lack of adequate time for planning and lack of reinforcement of curriculum in terms of school vending machines, food service and home environments, this programme demonstrated good diffusion and a high level of acceptability and commitment by teachers to continue to implement.	*Gortmaker et al., 1999 (100)* *Wang et al., 2003 (164)* *Wiecha et al., 2004 (168)*

self-assessment and self-fitness assessment
- 2-week TV-reduction unit.

Pathways - USA - Comprehensive multi-component school-based intervention to prevent or reduce obesity - Residents of 7 American-Indian communities - n=1704 students from 41 schools (grades 3–5) who completed baseline measures enrolled in the overall study. ***Activities*** - Culturally appropriate classroom curriculum to increase PA or promote healthy eating, food service intervention, and family programme - PA intervention targeted increased frequency and quality of physical education classes and activity breaks - Physical education intervention was based on the SPARK programme (Sports, Play and Active Recreation for Kids) - To enhance the cultural relevance, a unit of	**Effective** Knowledge of PA and diet improved in intervention schools, self-efficacy for PA improved in girls, and PA participation increased in girls and boys in the IG. Knowledge was retained over 3 years in the IG.	**Promising/insufficient evidence** PA levels increased in 3 of the 4 intervention schools, and was ~10% greater than in control schools (not significant).	**Not reported/not measured**	This programme achieved good intervention fidelity in the classroom, food service and physical education components. The family intervention achieved a participation rate of 63%. Student exposure was linked to a positive school "climate score". This is a good practice model of a school-based intervention involving community consultation and joint planning.	*Davis et al., 2003 (81)* *Gittelsohn et al., 2003 (98)* *Going et al., 2003 (99)* *Steckler et al., 2003 (157)* *Stevens et al., 2003 (158,289)*

traditional games was developed - Classroom instructors taught physical education three times a week.					
"Switch-Play" intervention - Aimed at reducing time spent in sedentary behaviours and increasing enjoyment and participation in physical activities - Adapted from SPARK, and Planet health - Based on social cognitive theory, behaviour choice theory and ecological theory. ***Activities*** - Curriculum aimed at increasing children's awareness of the use of time, health benefits, self-monitoring of sedentary behaviours and PA, their awareness of the home and community environments through map drawing and photographic techniques, decision-making skills and intelligent TV viewing - "Switch-Off" challenge was a pledge to turn off 1 TV programme per week	**Effective** More than 70% of parents in the IG were aware of the programme. More than 80% of children really enjoyed the programme.	**Effective** Average attendance was 88% and completion of home assignments was more than 50%. Well over half of children indicated they had changed TV viewing habits, and of these more than half reported increased time spent playing outdoors. More than half also reported that the intervention changed their use of electronic and computer games.	**Not reported/not measured**	This is a unique example of a multi-component programme, focused on specific goals which are addressed through a variety of supportive activities, integrated within the curriculum. The key aspect of this programme is its simplicity, and contracting or challenging the pupils to undertake change that is within their control.	*Salmon et al., 2005 (150)*

for 4 weeks - Included use of pedometers.					
PATH (Physical Activity and Teenage Health) programme - New York, USA - An inner city public school (IG=181, CG=165 children) - 11 weeks - Targeted ninth and tenth grade teenagers from minority groups - Aimed at reducing coronary heart disease risk factors. ***Activities*** - Curriculum: health promotion classes of 30 minutes, 5 times a week over 11 weeks - PA programme (circuit training) - 20–25 minutes PA followed by 5 minutes health promotion on diet, PA, stress, smoking - Students also received manuals.	**Moderately effective** Significant improvement in health knowledge – particularly on heart health – was seen in both boys and girls. No differences in health attitude scores.	**Moderately effective** Dietary habits significantly improved.	**Minimally effective** Total cholesterol values significantly decreased in girls only. Also in girls only, a significant improvement in fitness (estimated VO2 max). No differences in blood pressure, percentage body fat or BMI.	This programme was implemented by trained physical education teachers, with materials provided by a local tertiary institution. 5-minute lectures were immediately followed by exercise. Girls had lower baseline VO2 max and higher baseline cholesterol levels than boys.	*Fardy et al. 1996 (88)* *Bayne-Smith et al.2004 (71)*
Cardiovascular Health in Children - North Carolina, USA - 18 schools, in both rural and urban settings	**Moderately effective** There was a significant intervention effect on	**Moderately effective** Self-reported PA significantly increased in the IG versus CG. Trends for increased	**Moderately effective** Differences were not statistically significant at school level for cholesterol and diastolic	Trained teachers provided the intervention. This is a practical intervention as it was built on	*Harrell et al. 1996 (101)* *Harrell et al.*

- 8 weeks - Targeted children in third and fourth grades - Aimed at reducing CVD risk factors in elementary school children. ***Activities*** - Used existing curriculum from the American Heart Association Lower and Upper Elementary School Site Programme Kits on diet, PA and smoking (twice a week for 8 weeks) - PA programme (3 times a week) - A later version of the trial incorporated 2 arms: (1) regular classroom setting, and (2) high-risk children, with 5–8 people in a group.	knowledge concerning exercise, diet and smoking.	aerobic power.	blood pressure but were clinically meaningful. Trends for an intervention effect were found regarding a reduction in total cholesterol and body fat.	programmes readily available to schools. It did not require additional teachers or expensive materials to deliver the classroom component. Intervention for all children and not just those 'at-risk' avoids labelling, misclassification and screening costs.	*1998 (102)* *Harrell et al. 1999 (103)*
Action Schools! BC - British Columbia, Canada - 10 elementary schools randomly assigned to Usual practice (UP=3), Liaison school (LS=4) or Champion school (CS=3) - Training and resources depended on the level of intervention - 11 months - Based on the socio-ecological model approach. ***Activities*** - Multi-phase, multi-	**Promising/insufficient evidence** There was greater knowledge of the importance of F&V intake. Teachers perceived this aspect of the curriculum as important and observed changes in school lunch box contents.	**Effective** Intervention schools demonstrated a two-fold increase in PA levels in girls compared to control schools. The number of low-active children decreased by 9% in intervention schools. The increase in number of steps per day was between 7% and 25% in intervention schools,	**Promising/insufficient evidence** Trends towards greater fat loss in the IG. Hip bone mass increased more in the IG versus CG. Significant improvement in fitness compared to control schools.	The action plans of schools were tailored and covered all aspects of the 4 action zones. Teachers and administrators cited access to resources, flexibility, programme design and the "Action Schools! BC support team" as key facilitating factors. Barriers were competing curricular demands, lack of	*Naylor et al., 2006 (127,128)* *www.actionschoolsbc.ca*

discipline initiative involving a good-practice model that provides resources and recommendations for creating school-tailored action plans to integrate PA and healthy eating into the school environment - Intersectoral programme linking school and the surrounding community, health authorities and 3 government sectors - 4 components: (1) “healthy hearts”, (2) “healthy bones”, (3) “healthy school” and (4) “healthy self” (grades 4–7) - Action zones included: school environment, scheduled physical education, extra-curricular activities, school spirit, the family and community, and the classroom.		and decreased by 7% in control schools.		adequate preparation time, and scheduling constraints. According to the action plans and activity logs, fidelity to the model was demonstrated, along with a moderate degree of compliance (75%).	
ICAPS Intervention Centered on Adolescents' Physical activity and Sedentary behaviour - France - Randomized controlled trial - n=954 - Primary schools - 4 pairs of schools	**Effective** There was a significant improvement in self-efficacy, with some gender-specific differences. Leisure time PA was associated with improve self-efficacy.	**Effective** 50% participated in at least one weekly activity. At six months, there were significantly more pupils participating in supervised PA (36% up from 17% versus no change in CG, P < 10-4). The number	**Not reported/not measured**	*Simon et al., 2004 (155)* *Simon et al., 2006 (154)*

randomized on the basis of socio-geographical levels -- 11year- olds. ***Activities*** - Involved multiple partners - Objectives were to provide access to fun activities during and after school; encourage debate on PA; provide social support; change environmental factors to promote PA; emphasize fun and not competition.		of pupils that spent over 3 hours a day in sedentary activity decreased in the IG from 34% to 28% versus an increase in the CG,($P < 0.04$).			
GEMS (Girls Health Enrichment Multi-site Studies) - Memphis, Minnesota, Palo Alto, Houston, USA - Obesity prevention trial aimed at African-American primary-school girls (8–10 years old) - Disadvantaged communities - 2 phases, 7-year collaborative study. ***Activities*** - Phase I involved pilot testing interventions over 12 weeks including dance, food, fun and fitness summer camp, after-school intervention (twice a week), and interactive sessions with girls	**Moderately effective** The after-school programme was well attended and well received by girls and care-givers (Minnesota). The Memphis programme, involving weekly interactive sessions with parents and children, was also well received and attended. The dance intervention (Palo Alto) was well received and attended with high satisfaction ratings.	**Promising/insufficient evidence** Girls in the Memphis pilot increased PA levels by 12%. Only 50% of the girls involved in the summer camp followed by an Internet intervention logged in to the web site, thereby limiting exposure to the intervention dose (Houston). Generally behaviours, while not significant, were in the hypothesized direction of change in the IG. The dance intervention reported significantly reduced	**Promising/insufficient evidence** Most of the pilot studies were of insufficient length or power to determine clinically significant changes. BMI changes, although not significant, were in the hypothesized direction in the IG.	These are dynamic examples of a school-based intervention, targeting “at-risk” pupils in a disadvantaged community. The studies highlight the fact that no single intervention is likely to be successful, and that an emphasis on fun, satisfaction and enjoyment will increase uptake and attendance of children. This project allowed useful formative and pilot studies to be completed before time and energy were invested in replication.	*Robinson et al. 2003 (145)* *Story et al. 2003 (160)* *Beech et al., 2003 (72)* *Baranowski et al., 2003 (67,68)*

- Typically parents and families were involved; activities focused on both healthy eating and PA, with emphasis on fun.		household TV viewing time, fewer meals eaten in front of the TV, and increased after-school PA (counts).		However, those wishing to implement such programmes should note evidence of a social desirability bias on the measures of self-reported activity and diet.	
M-SPAN (Middle School Physical Activity and Nutrition study) - San Diego, USA - Randomized, controlled trial in 24 middle schools - n=1109, randomly allocated to intervention or control schools - 45% non-Caucasian pupils - 2-year intervention changing environment, policy and social marketing in the school - 72% and 60% response rates for surveys pre- and post-intervention respectively. ***Activities*** - Daily physical education, increased supervision, equipment and organized activity choices throughout the day (volunteer PA providers from the community) - Teachers gave class	**Not reported/not measured**	**Moderately effective** Intervention schools observed a higher increase in PA, both in and out of physical education class time. Boys increased activity both in and out of physical education time, whereas girls increased activity time largely during school time. No impact on dietary fat intake or self-reported PA levels.	**Moderately effective** BMI decreased significantly in the boys in the IG compared to the CG, with no evident changes in girls.	This programme demonstrated that school environment and policies, as well as the social norm within schools, may dictate to a large degree health behaviours. Activities implemented in these areas were effective in changing observed PA behaviour. Implementation of all of the desired policies, particularly with reference to food services, was limited by powerful financial barriers and limitations to messaging (prohibitions on sign placement).	*Sallis et al. 2003 (149)*

credit for out-of-class physical activity - Provided more low-fat food choices in food service/vendors, created a social norm for low-fat bag lunches through messaging - Health policy meetings 3 times in each school over the intervention period, guided by a manual with goal setting.					
Hip hop to health junior - Chicago area, USA - Obesity prevention programme targeting pre-school minority children - 5-year randomized intervention targeting 3–5-year-olds enrolled in Head Start programmes (pre-school for low-income communities) - Based on social learning theory, transtheoretical model, and self-determination theory. ***Activities*** - 14 weeks based on healthy eating and fitness concepts: 3 weekly sessions of 45 minutes - Use of puppets and characters to represent certain types of healthy	**Not reported/not measured** Parental attendance at diet sessions was low.	**Promising/insufficient evidence** Dietary saturated fat intake was significantly lower after year 1 in the IG compared to the CG. This was the only notable difference.	**Moderately effective** Intervention children had smaller increases in BMI compared to CG, at both 1- and 2-year follow-up.	While the results of this programme were modest, it reflects the feasibility of incorporating the concepts of healthy eating and regular PA into the programme for even very young children. In addition, this programme enriched the existing pre-school curriculum. A limitation to its implementation and feasibility, however, may be the involvement of the parents.	*Fitzgibbon et al., 2002 (89)* *Fitzgibbon et al., 2005 (90)*

foods and less healthy choices - The final 20 minutes of each session involved fun PA - Parents received a newsletter, twice weekly aerobics classes, and homework. Those completing the homework received financial compensation of US$ 5.					
Crete - Crete, Greece - Comprehensive multi-component school-based intervention. **Activities** - Non-competitive fitness activities in physical education, classroom talks on PA and health, personal goal setting, fitness testing, and involvement of parents. Included healthy eating and PA recommendations.	**Effective** Children's and parents' health knowledge improved in both groups, with greater improvement in the IG.	**Effective** Intervention children increased time spent on moderate to vigorous PA outside of school (120 minutes) compared to CG (24 minutes). Dietary fat and energy increased less in the IG versus CG ($P < 0.05$).	**Effective** Significant improvements in fitness, skinfold measures and plasma lipid profiles in intervention schools.	Important model of school-based intervention using personal goal setting with the children.	*Manios et al., 1998 (121)* *Manios et al., 2002 (123)*
Trim and fit programme - Singapore - National programme involving all school pupils aged 6–12, 13–16 and pre-university 17–19-year-olds. **Activities** - 4-pronged approach	**Not reported/not measured**	**Not reported/not measured**	**Effective** The prevalence of overweight in students significantly decreased from 14.0% (1992) to 9.4% (2004). Significant increase in proportion of students that pass	This is an important example of a national, government initiated programme, with built-in evaluation, which has apparently created a 'culture' of fitness and activity and	*WHO Workshop on Physical Activity and Public Health, Beijing, 2005*

involving school-wide programmes within curricula, "All Children Exercising Simultaneously" days, and extra-curricular group PA (jogs, hikes, etc.) - Teacher training, provision of sports and PA equipment within school grounds, and recognition through National Physical Fitness Awards - Ongoing since 1992 as part of government national healthy lifestyle programme.			physical fitness test (57.8% in 1992 to 81.1% in 2004).	changed the social norm. While it is difficult to evaluate in the absence of other secular trends or CGs, the direction of changes in fitness and fatness in children is towards reduced risk, and opposite to that seen in most developed countries over the same period.	
Chile comprehensive school based intervention - Chile - Comprehensive multi-component school-based intervention including the diet education programme grades of the Food and Agriculture Organization. **Activities** - 4–8 meetings with kiosk owners, parent meetings, "healthy snack" recognition, active living challenge, extra time in school programme (90 minutes per week), active recess and extra physical education activities,	**Promising/insufficient evidence** 66% of parents who had attended meetings reported incorporating some changes into their family lifestyle.	**Not reported/not measured**	**Moderately effective** Improved BMI, waist circumference and physical fitness.	Using the Food and Agriculture Organization curriculum, involving local kiosk owners, and providing basic equipment reduced barriers to implementation and increased the likelihood of intervention fidelity.	*Kain et al., 2004 (110)*

provision of basic sports equipment.					
APPLES - United Kingdom - Comprehensive multi-component school-based intervention using health promoting schools framework.	**Moderately effective** Levels of self-reported behavioural change, understanding, and knowledge improved. Global self-worth also improved in obese children in intervention schools.	**Promising/insufficient evidence** Vegetable consumption changed minimally in the IG. PA did not change.	**Insufficient evidence/not likely to be effective** Neither BMI, nor other clinical measures changed.	Using the health-promoting schools framework ensured compatibility with existing initiatives within the school health structure. Measurable changes in diet practice were found despite no significant difference in PA. This may be due to the length of the intervention, or measurement of PA behaviour.	*Sahota et al., 2001 (146, 147)*
Family fitness programme - California, USA - 6 schools randomly allocated to IG or CG - 20-week curriculum-based intervention. ***Activities*** - 3 physical education sessions of 30 minutes, emphasizing PA and fitness objectives - 2 diet education sessions of 30 minutes - Classroom teachers received 10 hours training and a curriculum guide	**Moderately effective** Intervention schools increased their knowledge scores more than the control schools.	**Promising/insufficient evidence** Reported dietary fat intake decreased in the IG, with no change in the CG. No change in reported PA.	**Insufficient evidence/not likely to be effective** No differences in BMI, cholesterol or skinfold measures.	This study provides another example of a multi-component, school-based intervention. Programmes such as these seem to have the greatest potential to change knowledge and behaviour.	*Hopper et al., 2005 (258)*

- Accompanying home programme for parents and learners to complete and earn points.					
Kanien'keha:ka diabetes prevention project - Canada - Comprehensive multi-component school- and community-based intervention based on Ottawa Charter for Health Promotion. ***Activities*** - Health education curriculum grades 1–6, focusing on type 2 diabetes, healthy eating and PA - Community activities involving local media and family promotional events - Policy changes including ban on junk food sold at schools and cycle and walk paths in communities.	**Not reported/not measured**	**Insufficient evidence/not likely to be effective** No differences between schools on reported activity, TV viewing time, F&V intake, sugar or fat consumption.	**Promising/insufficient evidence** Sum of skinfolds increased to a lesser extent in the intervention schools compared to controls, although run/walk times were not improved in IGs.	While this model supports and acknowledges the need for culturally appropriate school-based interventions with community participation, the secular trends overtook the intervention in this study and any short-term benefits were not maintained. Investigators also indicated that the intensity of the exposure among schools and classrooms varied and may explain a lack of consistent findings.	*Paradis et al., 2005 (134)*
The students and parents actively involved in being fit after-school programme - Detroit, USA - Parents (n=25) and children (n=56) - 12 weeks - Targeted African-	**Not reported/not measured**	**Promising/insufficient evidence** The consumption of fruit significantly increased in children and parents. Improved intake of salads, fruit juice and non-fried potatoes in children.	**Insufficient evidence/ promising** Diastolic blood pressure was reduced in children and parents. Systolic blood pressure also improved in children, while body fat, BMI and endurance improved in	No CG in the study design. Overall findings showed that children tended to gain more dietary benefits while parents gained more PA benefits.	*Engels et al. 2005 (85)*

American children and parents at an urban middle school - Aimed at increasing F&V intake and physical fitness. ***Activities*** - A 60–75 minute session, 4 days per week - PA programme - Diet learning activities - Information distribution.			parents.		
"Move it and groove it" - Australia - Primary-school programme - Aimed at supporting teachers through training, curriculum, web site and lesson plans - Creating a supportive environment through school policy and purchase of equipment.	**Insufficient evidence/ promising** Improved mastery of fundamental movement skills in children.	**Insufficient evidence/ promising** Small but significant increases in the amount of vigorous activity in physical education sessions.	**Not reported/not measured**	The focus on fundamental movement skills within curricula may increase adoption of PA behaviour in children.	*van Beurden et al., 2003 (163)*
Changing the tide - Small pilot intervention aimed at increasing exercise and healthy low-fat eating, involving 8 interactive video and Internet sessions in senior primary pupils from a low-income background.	**Not reported/not measured**	**Moderately effective** PA levels increased by more than 20 minutes a day in students completing more than 50% of the modules.	**Not reported/not measured**	This project demonstrated the potential of the Internet and interactive video media to deliver programmes involving PA and health promotion.	*Frenn et al., 2005 (96)*
Pedometer-intervention for targeted, low-active children	**Not reported/not measured**	**Insufficient evidence/ promising** PA levels increased in	**Insufficient evidence/not likely to be effective**	This study highlights the potential utility of adding pedometers or	*Schofield et al., 2005. (152)*

- High-school “low-active” girls, targeted as part of a cross-sectional study - Invited to keep log books of “steps” (IG1) or minutes of activity (IG2) - Included weekly meetings (weeks 1–6 with incentives) and reminder postcards (weeks 7–12).		IG1 based on 4 days step counting compared to the CG.	There were no measurable differences in fitness or BMI in either of the IGs nor in the CG over the intervention period, which may be due to the short duration.	some form of self-monitoring device on behavioural adaptation to an intervention programme.	
Eat smart, play smart versus Be smart - Comprehensive multi-component school-based intervention aimed at raising the value of healthy behaviours (e.g. decreased TV viewing), exposure to taste healthy snacks, incentives such as recognition and small prizes, development of practical skills, working with parents. **Activities** - Divided into 3 arms: (1) "Eat Smart", (2) "Play Smart" and (3) "Eat Smart Play Smart", versus CG "Be Smart".	**Promising/insufficient evidence** Diet knowledge increased in all groups.	**Promising/insufficient evidence** F&V intake increased, but no change in reported levels of PA.	**Insufficient evidence/not likely to be effective** No changes in anthropometry.	Targeted intervention in younger children may increase knowledge, although it may be difficult to determine whether these changes translate to behaviour.	*Warren et al., 2003 (165)*
Georgia fit kid project - After-school programme consisting of academic enrichment, a healthy snack and PA aimed at	**Not reported/not measured**	**Not reported/not measured**	**Not reported/not measured**	It is important to note that barriers to participation seem to include the lack of a safe environment to	*Yin et al., 2005 (171)*

"mastery" or to enhance skill learning - Intervention based on CATCH and SPARK - Children are involved in decision-making - Children are transported on buses to venues.				play.	

The Workplace (diet)

Intervention components	Outcomes			Policy/ process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
Worksite cholesterol screening with nutrition education - Colorado, Minnesota, Missouri and Washington, USA - 40 workplaces (IG=225, Usual care group=268), clients having cholesterol >200 mg - 1-month intervention following cholesterol screening and post-tests at 6 and 12 months - Aimed at lowering cholesterol levels - Behaviour based diet education programme. ***Activities*** - Usual care group: screening plus 5-minute education plus brochure	**Not reported/not measured**	**Not reported/not measured**	**Effective** A drop of 6.5% in cholesterol in IG and 3.0% in usual care group after 12 months. A 3.5% intervention effect.	The cost per person for the programme works out at about US$ 50. This study suggested that longer periods may be necessary to measure changes in cholesterol.	*Byers et al. 1995 (182)*

- IG: usual care plus group sessions (2 hours over a month) and a 30-minute video.					
Low-fat worksite intervention on blood lipids - Phoenix, Arizona, USA - 15 workplaces - Adults with cholesterol >5.2 mmol/l (IG=119 at 9 sites, CG=112 at 6 sites) - 8 weeks with post-test - Aimed at decreasing blood lipid levels by reducing dietary fat. ***Activities*** - 8 sessions of 30 minutes by dieticians advising on low-fat foods with eating pattern messages - Also used printed materials and media - Eating pattern messages to promote behavioural change.	**Not reported/not measured**	**Not reported/not measured**	**Effective (in short term)** IG showed a 3.8% decrease in total cholesterol, a 7.8% decrease in low-density lipoprotein cholesterol and a 5.2% increase in high-density lipoprotein cholesterol. Intervention effect on total cholesterol was –0.22 mmol/l.	Programme only focused on diet and was not re-evaluated over a longer period. This intervention is costly as it requires a health professional. However, it may be worthwhile for a company to employ a health professional if long-term results indicate significant improvements.	*Hartman et al. 1995 (195)*
CHIP (Coronary Health Improvement Project) - Illinois, USA - Medical care provider employees (IG=61, CG=76) - 4 weeks, post-test at 6 months - Aimed at improving cognitive understanding of healthy behaviours and chronic NCD risk factors.	**Moderately effective** IG improved significantly on the cognitive baseline test.	**Effective** Significant differences between groups at 6 months in diet (% E from fat, F&V, cholesterol, total fat, saturated fat, sodium) and PA.	**Moderately effective** Significant difference between groups at 6 months for BMI, weight, body fat percentage, diastolic blood pressure, cholesterol and high-density lipoprotein. Low-density lipoprotein much lower	This intensive programme was offered by a local college offsite in conjunction with dieticians and medical professionals, thus making it a costly intervention.	*Aldana et al. 2005 (172,222)*

Activities - Educational course over 4 weeks (2 hours a week) by health professionals at a local college - Information distribution (textbook and workbooks) - Access to shopping tours and cooking demonstrations by a dietician - Encouraged to follow preset dietary and exercise goals.			in the IG at 6 weeks but returned to baseline levels at 6 months.		
Computer-tailored nutrition intervention - Amsterdam, Netherlands - Employees of an oil company (IG=178, CG=169) - Aimed at decreasing fat and increasing F&V intake - One-off intervention comprising completion of baseline questionnaires, letters mailed to employees and post-test 3 weeks later. ***Activities*** - 1 group received tailored computer-generated feedback letters - CG received general diet information - Based on tailored feedback.	**Moderately effective** Positive change noted in intentions and attitudes towards reducing fat and increasing F&V intake. No effects on self-efficacy.	**Minimally effective** The IG had a more significant decrease in fat intake than the CG, but not F&V intake.	**Not reported/not measured**	Diet education tailored to individuals might be more effective than general diet education. However, in terms of costs it needs to be recognized that software has to be specially designed and individual results entered in the computer by another trained person.	*Brug et al. 1996 (179)*
Working well trial - 16 states, USA - Conducted in 111 work sites (n=28 000 workers)	**Moderately effective** A much higher level of co-worker	**Moderately effective** Significant difference in the	**Not reported/not measured**	Although the changes are very small, they are significant and will make a difference at population	*Sorensen et al. 1996 (213)* *Biener et al. 1999 for social*

- 2-year intervention and post-test at 3 years - Aimed at cancer prevention by addressing dietary change and smoking cessation - Based on stages of change theory and participatory strategies. ***Activities*** - Used peer employee advisory boards - Group sessions and interactive activities - Information distribution - Multimedia - Diet environment changes including cafeteria meals and point-of-purchase information - Policy changes in consultation with management.	support for a low-fat diet was noted, as well as management concern about employee health. Changes in dietary stage were associated with decreases in fat and increases in fibre and F&V intake.	% E from fat and fibre density and F&V intake of 0.18 servings/day. No significant effect on smoking. Intervention effect significant for a healthy food environment index. Those in the IG indicated increased access to F&V at work and better access to diet information.		level. This intervention is potentially very cost-effective and sustainable since it is mainly run by the employees themselves together with management. It was also found that longer, interactive intervention efforts (contests, classes) resulted in more positive outcomes than one-time activities, e.g. kickoffs or more passive activities. Contests were associated with increased fibre and F&V intake; and direct education with increased F&V consumption. Findings indicate that people in later stages of change were much more likely to move on to the action and maintenance stages than the CG. Stages of change seem to be useful to understand mediators of health promotion.	*and physical environment changes (177)* *Patterson et al.1997 for components associated with healthy diets (205)* *Glanz et al. 1998 (190)*
Take Heart II - USA - Revision of Take Heart I - 22 workplaces (IG=11 sites, n=169, CG=11 sites, n=193) - 19 months with post-tests - Aimed at reducing fat intake, levels of blood	**Promising/insufficient evidence** Significant beneficial effect seen on perceived social support in cohort sample.	**Moderately effective** Significant difference in fat intake, low-fat eating patterns, food habits scores and limiting fat in	**Not shown to be effective** No significant improvements reported in cholesterol, high-density lipoprotein cholesterol or total	Low programme participation may have influenced results, although there was some improvement over the first study. Greater structure and direction for the steering committee at the outset,	*Glasgow et al. 1997 (192)*

cholesterol and tobacco use. ***Activities*** - Same as *Take Heart* with an added PA component, improved guidelines for committees, more staff guidance and community networking.		the diet when analysed by cohort. Also significant decrease in fat intake in cross-sectional sample.	coronary heart disease risk score.	more user-friendly description of activities, greater focus on policy and environmental change and increased cooperation with community agencies, were seen by authors as positive and beneficial changes to the original study.	
The Well Works study - Massachusetts, USA - 1 of 4 intervention research centres in the *Working Well Trial* - 24 workplaces (n=2386) - 2 years with post-test - Based on a socio-ecological model. ***Activities*** - See *Working Well Trial* - Included integrated health protection (occupational hazards) and health promotion.	**Not reported/not measured**	**Moderately effective** Decrease in % E from fat of 2.3 in the IG versus 1.5 in the CG. F&V intake also increased by 10% versus 4% in CG. Significant effect on fibre intake among skilled and unskilled labourers.	**Not reported/not measured**	Integrated health promotion/ health protection programmes address concerns within the broader work environment and may contribute to a more supportive environment for general worker health.	*Sorensen et al. 1998 (214)*
Heath risk appraisal programme - Quebec, Canada - Maintenance employees at 6 hospitals (IG=216, CG=213) - Baseline and post-test 16–20 weeks later - Aimed at testing whether feedback on cholesterol test influenced outcomes of a programme aimed at	**Not reported/not measured**	**Moderately effective** Intake of saturated fats significantly decreased by 7.4% and of high-fat foods by 7.6%. No differences between the 2 study groups.	**Moderately effective** Blood cholesterol levels decreased by 4.8% ($P < 0.001$) and saturated fats by 7.4% ($P < 0.05$) in all subjects (IG and CG). No differences between the two study groups except for individuals with high blood cholesterol	This quick and cost-effective method showed significant changes in behaviour and cholesterol levels. The 20-minute diet education session was performed by a dietician. It is recommended that blood and diet results are evaluated over a longer period. Those with normal blood cholesterol levels who did not receive test results	*Strychar et al. 1998 (219)*

reducing dietary fat intake - Based on social learning theory. ***Activities*** - Cholesterol tested at week 1 and after 16–20 weeks. Only the IG received their cholesterol test results - Individual counselling (20 minutes) after first test by a dietician - Information provided - Mail reminder at 6 weeks - Participants signed a 3-month contract on behaviours they could change.			(>6.2 mmol/l) where there was an intervention effect.	had greater decreases in saturated fat intake. Normal test results may have given a false sense of security to some with a high saturated fat intake.	
Arizona 5-a-day programme - Arizona, USA - Lower income, multicultural, labour and trade, predominantly male population in 2 south-western cities (IG=363, CG=332) - 18 months and follow-up at 6 months after completion - Aimed at evaluating the use of peer educators to increase F&V intake - Based on peer education. ***Activities*** - IG and CG received a general 5-a-day core programme - IG also received a 5-a-day peer education programme	**Moderately effective** Overall, a significant improvement in knowledge and attitudes regarding F&V intake, which decreased at 6 months follow-up.	**Moderately effective** Overall, significant increase in F&V intake (0.77 servings daily, 24-hour recall). At 6 months follow-up, 24-hour recall increases of 0.41 daily servings.	**Not reported/not measured**	Educators received 16 hours of training over 8 weeks. One of the benefits of this programme is that it was largely organized and managed by the employees. This can make it more cost-effective and allow for better support by staff. Peer education can be used with employees who rely on informal sources and whose work presents barriers to wellness activities. Decreasing effect at follow-up. It is not clear how long the positive effects would last in the absence of maintenance programmes/ activities.	*Buller et al.1999 (180)* *Buller et al. 2000 for process evaluation (181)*

- Core: group information distribution, cafeteria promotions and speakers - Peer group: one-on-one interactions, small group discussions or presentations/ meetings.					
Treatwell 5-a-day study - Massachusetts, USA - Adult workers (mainly low income) at 22 community health centres (n=1306, CG=8 sites, IG1=7 sites, IG2=7 sites) - 20 months with post-test - Aimed at increasing F&V and decreasing fat intake - Based on socio-ecological model. ***Activities*** - 3 arms: (1) CG: core intervention only, (2) IG1: workplace only, (3) IG2: workplace plus family - Activities for IG1 and IG2: - Employee advisory boards (worker participation) - Group sessions (10 sessions of 30 minutes) - Diet education activities - Environmental changes - Information distribution - Multimedia - Individual advice.	**Effective** A higher number of activities led to much better programme awareness and greater change in F&V intake. Higher participation in activities was significantly correlated with the changes.	**Effective** Total F&V intake increased significantly by 19% in the workplace plus family group, and 7% in the workplace only group compared with the CG. There was a significant increase in co-worker support in both IGs.	**Not reported/not measured**	One of the benefits of this programme is that it was largely organized and managed by the employees. This can make it more cost-effective and allow for better support by staff. It is 1 of 3 workplace interventions in the National 5-a-day for better health campaign (National Cancer Institute).	*Sorensen et al. 1999 217* *Sorensen et al. 1998 for worksite and family education (215)* *Hunt et al. 2000 for process evaluation (197)* *Hunt et al. 2000 for employee involvement (196)*

Next step trial - USA - 28 workplaces (IG=1578, 15 sites, CG=1899, 13 sites) in high-risk male auto-workers - 2 years with evaluation at year 1 and year 2 - Aimed at preventing colorectal cancer by reducing fat, increasing F&V and fibre intake - Based on social cognitive theory, social support principles and stages of change from transtheoretical model. ***Activities*** - 5 diet classes and mailed self-help materials in first 12 months - Personalized feedback and workplace posters in second 12 months.	**Moderately effective** Significant increase in predisposing factors for dietary change and the likelihood of moving into action or maintenance stages.	**Minimally effective** Significant improvement for fat, fibre and F&V at year 1. Significant only for fibre after 2 years due to significant positive changes in control sites.	**Not reported/not measured**	This programme is feasible and fairly effective even though differences in outcomes are small. The process evaluation found that changes in predisposing and enabling factors, and change at follow-up, were associated with significant dietary changes. Interventions that target norms and eating environments in addition to skills and knowledge may further increase intervention effectiveness. Age and dose effects suggest that younger employees may be more responsive to this intervention.	*Tilley et al. 1999 220* *Kristal et al. 2000 (262)*
Working healthy project - Rhode Island and Massachusetts, USA - In 1 study centre of the *Working Well Trial* - 26 workplaces (IG=13, CG=13 sites, n=2055) - Two-and-a-half years with mid- and post-tests - Aimed at increasing F&V and decreasing fat intake, increasing PA and smoking cessation	**Not reported/not measured**	**Moderately effective** A significant increase was noted in the IG versus CG in F&V and fibre intake, but not in fat. Significant increase in regular exercise. No significant difference in	**Not reported/not measured**	Comments as presented for the *Working Well Trial*, with PA as an advantage. Inclusion of PA as an additional target behaviour did not appear to detract from positive diet outcomes.	*Emmons et al. 1999 (189)*

- Based on participatory strategies. ***Activities*** - See *Working Well Trial* - Included a focus on PA and a mid-trial survey.		smoking cessation.			
Low-intensity nutrition intervention - Belgium - 4 workplaces in men (IG=272, CG=366) - 3 months with post-test - Aimed at decreasing dietary fat and blood cholesterol. ***Activities*** - Personal counselling session with feedback - Mass media (posters, leaflets, video, newsletters) - Group counselling of 2 hours by dieticians - Information distribution - Environmental changes.	**Effective** IG had significantly higher diet knowledge scores than the CG.	**Moderately effective** Significant difference in total calories, carbohydrate, protein and % E from total fat between IG and CG.	**Minimally effective** Blood cholesterol levels significantly improved in participants who had high levels originally. IG showed a small but significant increase in BMI.	This intervention was successful in obtaining some self-reported dietary changes and decreased cholesterol levels in men at risk.	*Braeckman et al. 1999 (178)*
Heartbeat Award Scheme - Leicestershire, United Kingdom - 6 workplaces (IG=4, n=453; CG=2, n=124) - 6 months with post-test - Aimed at increasing dietary knowledge and attitudes regarding a healthy diet - Diet goals of the scheme were to reduce total fat, sugar and salt, and increase	**Minimally effective** Diet knowledge did not change significantly. Employees noticed healthy eating information and acknowledged that it was easier to eat a healthy diet after the	**Not reported/not measured**	**Not reported/not measured**	The intervention was successful in raising awareness of healthy eating but not in enhancing predisposing factors. Two key elements seem to be missing from the scheme: (1) advising individuals how to overcome barriers to change, and (2) motivation by providing feedback on performance with specific	*Holdsworth et al. 2000 (198)*

the availability of fibre-rich, starchy foods - Based on environmental strategy to change behaviour using stages of change, social learning theory and social marketing. ***Activities*** - Supportive environment for healthy eating - Information provided such as leaflets, posters, tent cards and labelling of healthy choices.	scheme was introduced.			goals.	
Seattle 5-a-day worksite programme - Seattle, USA - 28 workplaces (IG=14, n=1169, CG=14, n=1226) - 12 months and post-tests at 2 years - Aimed at increasing F&V intake in workers - Unique feature was the sequencing of strategies along a timeline, based on the stages of change model. ***Activities*** - An employee advisory board - Group sessions - Information distribution - Multimedia - Cafeteria/food service changes.	**Not reported/not measured**	**Moderately effective** Significant intervention effect of a 0.3 daily serving of F&V. Plate observation at cafeterias showed intervention effect of a 0.16 serving of F&V.	**Not reported/not measured**	This kind of intervention can achieve important health benefits in a large population because of its potential to reach large numbers; it may also be cost-effective for the employees to take responsibility for their own programme. The national 5-a-day for better health campaign started during this project and hence there was a secular trend of increasing F&V intake in control sites. The intervention was associated both with increased employee use of the activities and materials and with increased intake of F&V.	*Beresford et al. 2000 (175) for process evaluation 2001 (176)*

Minimal intervention to reduce fat intake - United Kingdom - Hospital workers (n=517) mostly females - One sentence feedback on baseline survey and post-test after 5 months - Aimed at decreasing diet fat intake - Based on stages of change model. ***Activities*** - IG and CG both received general information leaflets - IG also received personalized feedback on their current dietary fat intake.	**Not reported/not measured**	**Effective** Total fat decreased by 8.6% in the IG versus 0.2% in the CG. Saturated fat also decreased in the IG by 9.3% versus 1.7% in the CG. The intervention reduced fat intake in high-fat consumers and prevented low-fat consumers from increasing their fat intake.	**Not reported/not measured**	Personalized feedback is relatively quick and inexpensive and could be administered by a trained person.	*Armitage and Conner 2001 (173)*
Changing risk factors for chronic diseases - South Auckland, New Zealand - Men at 2 manufacturing workplaces (IG=116, CG=110) - 6 months and post-tests at 6 and 12 months - Aimed at increasing F&V intake and PA, decreasing fat intake, and improving blood pressure and BMI - Based on stages of change model. ***Activities*** - Key workers consulted in	**Effective** There was significant improvement in diet knowledge at 6 and 12 months. Attendance at more workshops was associated with greater knowledge.	**Moderately effective** Significant difference between groups for reduced fat and increased vegetable intake at 6 and 12 months. No difference in fruit and alcohol intake. Significant increase in PA.	**Minimally effective** Significant difference in systolic blood pressure at both 6 and 12 months, but not in BMI or waist circumference. A reduction in BMI was associated with a reduction in fat intake.	A low-level intervention can significantly improve certain risk behaviours, including diet and knowledge. A longer duration may be necessary for some physical improvements.	*Cook et al. 2001(185)*

planning the programme - Group counselling (workshop of 30 minutes per week for 6 months) - Cafeteria/food service changes and point-of-purchase advertising.					
Intervention strategies for risk factor modification - Industrial unit in India - Adults (n=2500). ***Activities*** - Health education, individual counselling, availability of healthy diet - First group vigorously introduced and accepted intervention strategies - Second group showed limited compliance.	**Not reported/not measured**	**Not reported/not measured**	**Limited effectiveness** Fewer employees had high cholesterol. The number of overweight employees increased, but the rate of growth was less in group 1.	Requires commitment from participants for strategies to be successful.	*Pingle et al. 2001 (207)*
Health works for women - North Carolina, USA - 9 rural small workplaces, female blue collar workers (IG=282, CG=256) - 18 months with post-tests at 6 and 18 months - Aimed at increasing F&V and decreasing fat intake as part of overall health promotion programme including PA, cancer screening and smoking - Based on social cognitive theory, stages of change	**Moderately effective** There were significantly more women who considered changing their behaviour in the IG versus the CG.	**Moderately effective** Significant difference in F&V intake at 18 months (0.7 servings/day). Significant difference in fat intake at 6 months but not at 18 months. PA also improved (strength and flexibility). Rates of smoking	**Not reported/not measured**	This intervention is very intensive since each woman is surveyed twice over 6 months and then receives a computer-generated magazine with tailored messages. An innovative strategy was the use of peer workers who were trained to provide advice and support.	*Campbell et al. 2002 (183)*

transtheoretical and social support models. ***Activities*** - Individualized, computer-tailored messages - Peer educators (natural helpers).		and cancer screening did not differ between groups.			
Heart at work programme - South-eastern USA - 2 manufacturing sites, mainly line workers (IG=223, CG=410) - 1 year with immediate post-tests - Aimed at decreasing multiple risk factors for CVD - Based on social cognitive theory. ***Activities*** - 4 modules (2 modules on PA, 1 on low-fat diet and 1 on CVD risk) - Mass media distribution - Employee feedback - PA programme - Changes in cafeteria and vending machines - Individual dietary feedback - Incentives offered - Screening of blood pressure, cholesterol and glucose levels.	**Effective** Knowledge and self-efficacy increased significantly in the IG in all respects.	**Minimally effective** The only significant difference was that respondents in the IG were two-and-a-half times more likely to begin blood pressure treatment.	**Not shown to be effective** Improvements at both sites but not significantly different between the IG and CG.	Support included an on-site health care coordinator and a nurse responsible for programme implementation and providing feedback for those at CVD risk. The ability to influence behaviour and clinical measures may require a more intensive intervention.	*Pegus et al. 2002 (206)*
Well works II - Eastern Massachusetts, USA	**Not reported/not measured**	**Not shown to be effective (for dietary variables)**	**Not reported/not measured**	The focus of this study was on organizational and environmental	*Sorensen et al. 2002 (216)*

- 15 manufacturing workplaces (IG1=3710, IG2=3617) - IG1=Health promotion - IG2=Health promotion plus occupational health and safety - 2 years with follow-up - Aimed at smoking cessation and increased F&V intake - Based on the socio-ecological model. ***Activities*** - Both groups used employee advisory boards - Both targeted smoking and diet - IG2 also tartgeted reduced occupational exposures.		Smoking quit rates among blue collar workers more than doubled in IG2 versus IG1. No significant difference between groups in F&V intake.		improvements as well as individual health behaviour changes. The intervention is built on the premise that the targeted managers and workers make decisions on the objectives together. The intervention was very successful for smoking cessation.	
Danish 6-a-day worksite canteen model study - Denmark - 5 workplaces with canteens (n=909 customers) - 1 year with 4-month post-test - Aimed at increasing daily F&V intake of employees using the canteens - Based on environmental and structural strategies used in canteens. ***Activities*** - Cafeteria/food service changes - 8 hours training of canteen	**Not reported/not measured**	**Effective** Significant increases were seen in total F&V consumption (average 95 g per customer).	**Not reported/not measured**	An advantage of this type of programme is that it can be cost-effective since it involves an initial 8-hour training for staff, followed by goal setting and 3–4 interim support visits. The canteen managers and staff themselves have a lot of freedom to be creative and achieve goals.	*Lassen et al. 2004 (202)*

staff.

Feedback strategies - Netherlands - Adult students and employees of adult education centres (n=304) - Aimed at exploring immediate effects on awareness and intention to change intake of fat and F&V - Based on Weinstein's Precaution Adoption Process Model. ***Activities*** - Single feedback intervention using 2 different methods: (1) interactive computer-tailored intervention, and (2) printed self-test forms. CG received general diet information.	**Promising/insufficient evidence** Intention to reduce fat consumption and to eat more vegetables was greater in IG1.	**Promising/insufficient evidence** Self-rated fat and fruit intake was more realistic in IG1.	**Not reported/not measured**	Only the tailored intervention had an immediate impact on awareness and dietary change intention. This may be a promising tool for inducing steps towards behavioural change. The intervention could be implemented and disseminated via the Internet. However, it would need to be evaluated over a longer period.	*Oenema et al. 2003 (203)*
Interactive multimedia program - Colorado and Illinois, USA - 2 workplaces (IG=260, CG=257), predominantly female, college-educated workers - 30 days followed by post-tests at 30 and 60 days - Aimed at decreasing dietary fat and increasing F&V intake - Based on the transtheoretical stage of change model. ***Activities***	**Effective** Significant intervention effects were reported for stage of change to adopt a low-fat diet, for intention and self-efficacy to reduce dietary fat and for attitude towards the importance of diet.	**Moderately effective** Significant intervention effects after 30 and 60 days for self-reported consumption of fat and F&V.	**Not reported/not measured**	This approach may be effective for people with poor reading skills. Easy, user-friendly program that does not require computer skills. However, there are considerable costs in developing the program which may quickly become outdated. Furthermore, it needs to be tested over a longer period, such as a year.	*Irvine et al. 2004 (199)*

- A computer program tailored to the user by gender, interests, race and age combining audio, video, graphics and printouts.					
California 5-a-day be active worksite programme - 3 strategies are currently employed in the programme: (1) improve access to healthy foods and PA at the workplace, (2) create healthy supportive environments, and (3) establish public policies to boost health promotion - Based on formative research.	**Not reported/not measured**	**Not reported/not measured**	**Not reported/not measured**	The *California Fit Business Kit* and the *Take Action! Employee Wellness Programme* were developed to meet the needs of the programme.	*Backman et al. 2004 (174)*
Email intervention - Alberta, Canada - 5 workplaces (IG=1566, CG=555) - 12 weeks with post-tests - Aimed at preventing diabetes by promoting healthy diet and PA - Based on social cognitive theory. ***Activities*** - Comprised 1 e-mail message a week over 12 weeks.	**Moderately effective** Significant differences in dietary stage of change for healthy cooking and general diet, as well as in PA measures.	**Moderately effective** Significant differences in self-reported healthy eating practices, balanced diet, and enjoyment of meals. Also significant differences in PA measures.	**Not shown to be effective** No difference in BMI measures.	This is a cost-effective, sustainable programme for workplaces where employees have access to e-mail. Tailoring messages to individuals and increasing message frequency and intervention duration may improve efficacy of intervention. Longer term effectiveness needs to be evaluated.	*Plotnikoff et al. 2005 (208)*
Take heart I - Ore, USA - 24 workplaces (IG=12, n=109, CG=12, n=109)	**Minimally effective**	**Minimally effective**	**Minimally effective**	This was a well designed study. The authors believe that the negative results may be because they used	*Glasgow et al. 1995 (191)*

- 18 months with post-tests - Aimed at reducing fat intake, reducing cholesterol and smoking cessation - Based on stages of change model. ***Activities*** - Steering committee of employees - Group counselling - Diet activities - Information distribution - Policy changes - Restaurant/café changes - Multimedia.				workplaces rather than self-selected volunteers as the unit of analysis.	
Educational and environmental intervention in Dutch worksite cafeterias - Netherlands - 17 workplace cafeterias, white collar workers (n=1013) - 6 months with post-test - Aimed at increasing F&V and decreasing fat intake. ***Activities*** - 4 arms: (1) education programme with information distribution, (2) food supply programme with more F&V and low-fat products available in canteens plus education programme, (3) labelling programme of low-fat items in canteens plus education programme, and (4) CG.	**Not reported/not measured**	**Minimally effective** The labelling programme had a significant effect on total fat intake for those who believed they ate a high-fat diet at 1 month. Sales data showed a significant effect of labelling on desserts only.	**Not reported/not measured**	A small number of respondents noticed labelling or new healthy products. The intervention may require more time to be successful in changing dietary behaviour. Interventions that are largely aimed at men may be more successful if focused on taste rather than health. More visual and attractive labels and price reduction strategies are recommended.	*Steenhuis et al.2006 (218)*

The workplace (physical activity)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
CHIP (Coronary Health Improvement Project) - Illinois, USA - n=145. ***Activities*** - Offsite meetings 4 times a week for 4 weeks - Textbooks and workbooks distributed, written assignments - PA message: 30 minutes of moderate PA per day - Participants received pedometers and kept exercise log books.	**Moderately effective** Baseline PA knowledge increased from 64% to 95%.	**Moderately effective** Total steps per week increased by 25% after 6 weeks.	**Moderately effective** BMI, weight, body fat percentage and cholesterol decreased at 6 weeks and again at 6 months.	An intensive 4-week programme resulted in significant improvements 6 weeks and 6 months after the intervention. Programme costs were refunded to participants by employer upon successful completion.	*Aldana et al. 2005 (222)*
E-mail intervention to promote physical activity and nutrition behavior - Alberta, Canada - n=2121 with e-mail access - Based on the social cognitive theory. ***Activities*** - Weekly PA and diet e-mail messages for 12 weeks - PA messages based on specific belief items for predicting PA behavioural change.	**Moderately effective** Increased self-efficacy and intention to change. Perceived more benefits of PA as well as greater health risks due to inactivity.	**Moderately effective** PA increased.	**Not reported/not measured**	E-mail based interventions that are targeted and based on the social cognitive theory are a cost-effective method to increase habitual PA. However, only 16% of employees agreed to receive the e-mails.	*Plotnikoff et al. 2005 (208)*

First step programme - Prince Edward Island, Canada - 2 phases: (1) adoption, 4 weeks, and (2) adherence, 8 weeks. ***Activities*** - Phase 1: lunchtime meetings once a week – no PA - Phase 2: contact maintained via e-mail - Individualized goals monitored by pedometer - Recorded steps on personal calendar or Internet.	**Not reported/not measured**	**Moderately effective** Steps per day increased from 7029 +/- 3100 (SD) at baseline to a plateau of 10480 +/- 3224 steps/day.	**Moderately effective** Body weight, BMI and resting heart rate decreased significantly.	Those with over 11 000 steps per day at baseline were twice as likely to drop out of the programme as those who were taking fewer steps. Thus this programme may be better suited to those who are insufficiently active.	*Chan et al. 2004 (184)*
Move and improve - Programme established in 1996 by the Eastern Maine Medical Center - Aimed to motivate employees to increase PA levels and make healthier lifestyle choices - Based on the community participatory research approach. ***Activities*** - 12-week free programme affiliated through workplaces and communities - Recruited via newsletters and collaborating partners - Volunteer site coordinators - Participants involved in log activity received	**Moderately effective** More than 30% increased their PA in 2003 and more than 60% increased their PA readiness in 2004. Comparison groups saw little or no change.	**Moderately effective** More than 40% of people completed the programmes in 2003 and 2004. Decreased fat intake and TV viewing, and increased F&V consumption were reported by more than 30% of participants. These changes were linked to stage of change differences.	**Moderately effective** More than half the participants in 2004 reported weight loss. Employees who had improved PA readiness experienced fewer sick days than those who remained the same or regressed.	Participation in this programme increased from 1000 people in 1997 to more than 11 000 in 2004, when 35% were first time participants. The study sample may be biased in that participants are self-selected. However, a simple evaluation demonstrates a viable and sustainable programme, using the community-based participatory research approach. Furthermore, it demonstrates that PA	*Polacsek M et al., 2006 (210)*

encouragement and tips throughout the programme - Community stretch breaks at the local mall, monthly walking clinics, fitness assessments and other activities - Evaluation for 2003 and 2004 is a cross-sectional design including non-participant comparison workplaces. Post-test surveys were conducted on 100 randomly selected participants, with 31% completing the evaluation.				may provide a vehicle for health promotion to address associated lifestyle risk factors. Elements that facilitated participation included flexitime policies in the workplace, group activities and incentives. There is a need to recruit high-risk individuals into the programme and to improve overall retention.	
Dutch PACE - Enschede, Netherlands - n=299 municipal workers - 9 months - Counselling based on stage of change. ***Activities*** - Employees received 7 individual consultations - Primary aims to increase PA and improve diet.	**Not reported/not measured**	**Minimally effective** Total energy expenditure increased.	**Moderately effective** Improvements noted in body fat (–1.39) and cholesterol (–0.21 mmol/l).	The counsellor in this study focused on vigorous intensity PA. More individuals may have met PA recommendation had the focus been on moderate intensity PA.	*Proper et al. 2003 (211)*
Individualized PA recommendations - Norway - n=131 with sedentary jobs - 6 months. ***Activities*** - One-on-one assessment,	**Not reported/not measured**	**Moderately effective** There was an increase in days per week and duration of moderate and vigorous intensity PA. Increase in time spent walking.	**Minimally effective** Increase in VO2 max.	An initial one-on-one interview followed by voluntary counselling session for 6 months seems an effective way to increase habitual PA.	*Osteras and Hammer 2006 (204)*

goal setting and PA prescription - Employees were offered follow-up counselling sessions.					
Transtheoretical model interventions - Georgia, USA and Taiwan, China <u>Georgia</u> - n=366 college employees - Assessment conducted 1 month after receiving educational materials. <u>Taiwan</u> - n=133 sedentary office workers - Individuals received educational materials based on stage of change, while those in the CG received a generic self-help manual.	**Moderately effective** Self-efficacy increased overall. Perceived exercise benefits increased, and perceived barrier scores decreased in Taiwan.	**Minimally effective** Both groups increased PA levels.	**Not reported/not measured**	Targeted messaging based on transtheoretical stages of change results in increased PA, but may not be more effective than generic messages. However, transtheoretical-based messaging improves attitudes and perceptions towards PA.	*Griffin-Blake 2006 (193)* *Kao et al., 2002 (200)*
ALIFE@Work - 7 Dutch companies - Targeting individuals with BMI $\geq$ 25 - Randomized controlled trial with three arms: (1) CG, (2) telephone intervention, and (3) Internet intervention - 6 months - Based on cognitive behavioural approach. ***Activities*** - 10 lessons with individual	**Not reported/not measured**	**Not reported/not measured**	**Not reported/not measured**	This study description is included as a useful "start-up" example for conducting research within a workplace setting and for the measurement of both proximal and clinical outcomes, moderating factors, and process evaluation. The results of this study are likely to be broadly	*van Wier MF et al., 2006 (221)*

feedback from counsellor - Lesson content combined with behavioural change strategies.				applicable in the future.	
Working Healthy Project - USA - 26 manufacturing workplaces, with an average 337 eligible employees per site - final sample was 22 workplaces, n=2291 workers, randomized and matched with control site - Grounded in community activation and social learning theory. ***Activities*** - Multiple risk factor intervention - Kick-off event - Provision of educational and motivational materials - Self assessment with feedback - Self-help and self-management skills training - Contests and incentives - Group-based classes - Point-of-purchase programme in canteen and catering - Smoking control policy - Participatory intervention approach with an employee advisory board	**Moderately effective** Both IG and CG demonstrated movement towards increased readiness for PA, but more in IG.	**Effective** Self-reported PA increased from 40% to 51% in IG, with no change in CG. Small but significant increases in F&V and fibre intake in IG versus CG.	**Not reported/not measured**	This is an example of a multiple risk factor, workplace intervention in which behaviour as well as knowledge and readiness increased significantly. Data here reflect the results of the total remaining cohort of people exposed over the whole duration of the intervention and those undergoing a mid and final assessment. The lack of follow-up is down to a poor economic environment at the time of the study, with downsizing, loss of morale, etc. Finally, the standard care CG offered more than may be typical in a workplace health promotion; it is thus difficult to interpret truly the dose-response relationship between intervention and behavioural	*Emmons et al., 1999 (189)*

- Compared to standard care condition with smoking cessation and diet self-help intervention.				change.	
Heart at work - USA - 2 groups at manufacturing sites - Quasi-experimental design - Largely involved factory workers: machine operators (75%), clerical, engineering and laboratory staff - 21% of IG site and 40% of CG site employees completed the baseline and follow-up survey - Based on the socio-ecological model and social marketing. ***Activities*** - Initiated at health fair for employees - On-site health care coordinator and trained nurse to implement and liaise with management - 4 modules: (1) Just move, (2) Low-fat is where it's at, (3) Know your numbers, and (4) Adopt a couch potato. - Implemented via e-mail messages, facilitated group activities, construction of a walking track, vending machine programme,	**Effective** IG site employees were 1.5–2.2 times more likely to have improved knowledge concerning blood pressure control, CVD risk factors, nutrition and diet than CG site employees. IG employees were three times more likely to have improved self-efficacy for healthy eating and weight loss.	**Promising/insufficient evidence** IG site employees were more likely to begin blood pressure treatment than CG. No other treatment effects on health behaviour were significant.	**Moderately effective** Significantly, IG site employees were two times less likely to lose work days for health reasons than CG site employees.	This is a good example of a workplace programme that includes all staff, from shop floor through to technical staff. It incorporates both the socio-ecological model, in terms of addressing environmental factors, as well as social marketing. However, like many other programmes, knowledge and even self-efficacy do not necessarily translate into changes in behaviour. One promising outcome was the difference in health-related absenteeism in the IG group versus CG. The limiting factor to interpretation is the poor follow-up response rate, which may bias the outcomes in favour of the intervention.	*Pegus et al., 2002 (206)*

smoking screening programme, etc.					
PA and health workshops - Auckland, New Zealand - n=570 male, blue collar workers - 6 months. ***Activities*** - Workshop of 30 minutes, once a month - PA and associated benefits were presented among other topics related to reducing risk of NCD.	**Insufficient evidence/ promising**	**Moderately effective** Moderate and vigorous PA increased by 0.9 and 1.2 activity hours per week respectively.	**Moderately effective** Systolic blood pressure improved.	Workers played a role in programme development and delivery and may have played a role in high retention rates (94%).	*Cook et al. 2001 (185)*
Supervised onsite PA sessions - Helsinki, Finland - n=87 - 9 months (follow-up measures at 1 and 5 years). ***Activities*** - 1-hour PA sessions twice a week - 2 PA groups based on fitness level - Lectures on PA and benefits.	**Not reported/not measured**	**Insufficient evidence/ promising** Changes in fitness were largely maintained after 5 years.	**Moderately effective** Percentage body fat, muscle endurance, muscle strength, sit and reach and aerobic fitness, all improved.	Exercise sessions were conducted during the last hour of work and employees were not required to work overtime to compensate for exercise time.	*Pohjonen and Ranta 2001 (209)*
PHLAME fire fighters study (Promoting Healthy Lifestyles: Alternative Models Effects) - USA - n=33 professional firefighters	**Insufficient evidence/ promising** The model 1 IG noticed significant improvements in	**Moderately effective** Team participants significantly increased personal PA time.	**Moderately effective** Significant improvements noted in low-density lipoprotein cholesterol	Team-based interventions may be effective in channeling peer motivation and interaction to increase PA and diet habits.	*Elliot et al. 2004 (188)*

- Based on social learning theory. ***Activities*** - Model 1: Team intervention with only educational sessions. Ten 45-minute peer-taught sessions with work books and educational games - Model 2: Firefighters received 4 initial one-on-one counselling sessions, plus 4.5 hours of telephone and in-person contacts - Trained expert identified stage of change and encouraged improvements or maintenance of healthy lifestyle, using non-prescriptive interviewing techniques - Both groups received "Firefighter's health and fitness guide".	their co-workers' PA habits.		concentration for both intervention models.		
Occupation-based physical activity intervention for members of the police force - North Carolina, USA - Quasi-experimental study for over 1500 police trainees (85% men) - 25 sites - Allocated to usual training or experimental sites. ***Activities***	**Not reported/not measured**	**Not reported/not measured**	**Moderately effective** Cardiovascular fitness improved significantly in the IG, along with decreased body fat, and improved flexibility and general muscular strength.	The programme has implications for the implementation of occupation-based fitness programmes, particularly as it was peer led. Training for group leaders was minimal, yet effective. Attention to issues of rank and coercion is needed with respect to	*Harrell JS et al., 1996 (194)*

- Peer-led programme requiring minimal equipment - Leaders received 1 week of additional training.				the exercise training programme.	
Diabetes and PA awareness programme - Auckland, New Zealand - n=207 multi-ethnic hospital workers - 14 weeks. ***Activities*** - Diabetes educational meetings led by someone of same ethnicity as employees - Exercise programme during last 30 minutes of work - Mostly seated exercise initially - Started once a week for 15–30 minutes. Increased to 5 times a week for 60 minutes.	**Moderately effective** Knowledge scores for diabetes increased from 23 to 39 in IG (23 to 25 in CG).	**Moderately effective** The number of employees exercising over 30 minutes per day at least 3 days per week increased from 33% to 35%.	**Not effective** BMI and weight did not improve.	The programme was culturally sensitive and, since it started with seated PA, more employees were willing to participate.	*Simmons et al. 1996 (212)*
Peer-led PA intervention - US Railroad Company - n=148 - Educational course twice a week for 3.5 weeks. ***Activities*** - Included videos, group activities, classroom instruction and self-study materials - Employees encouraged to meet with course leader and use self-study materials if	**Insufficient evidence/ promising**	**Minimally effective** Increased self-reported PA but no increase in weekly energy expenditure.	**Not reported/not measured**	Course took place during existing meeting times and did not interfere with production. A job layoff at one site confounded comparisons between locations.	*Elbel et al. 2003 (187)*

they missed a course.

The community (diet)

Intervention components	Outcomes			Policy/process implications	*References*
	Knowledge and attitudes	**Behavioural changes**	**Physical and clinical changes**		
Women's Healthy Lifestyle Project - Pennsylvania, USA - Healthy pre-menopausal women, 44–50 years (n=535) - 5 years and evaluation after 6 months and 4.5 years - Aimed at decreasing fat, saturated fat and cholesterol intake, increasing PA and preventing weight gain - Based on cognitive-behavioural approach. ***Activities*** - Group sessions: clients followed a low energy, low-fat (< 25%) diet - Increased energy expenditure through a PA programme - 20-week group session intensive phase and 20-week group session maintenance phase - Thereafter group, mail or telephone contact every 2–3 months and refresher programmes and quarterly newsletter - Follow-up group and	**Not reported/not measured**	**Effective** At 6 months diet intake decreased significantly from 1618 to 1369 kcal/d, total fat from 36% to 25%, saturated fat from 12% to 8% and cholesterol from 210 to 140 mg/day. After 4.5 years the IG was more physically active and reported eating fewer calories and less fat than the CG.	**Effective** After 6 months the IG showed a significant decrease in weight, waist-hip ratio, waist, blood pressure, total cholesterol, low-density lipoprotein cholesterol, triglycerides, high-density lipoprotein cholesterol and serum glucose. After 54 months there was an increase in low-density lipoprotein cholesterol in the IG but an increase in the CG. Waist circumference increased more significantly in the CG (p=0.000).	Weight gain and increased waist circumference during the peri- to- post-menopause can be prevented to a significant degree with a long-term lifestyle dietary and PA intervention. The programme was led by trained diet and behavioural interventionists. The groups were taught behavioural strategies and self-monitored their diet and PA programmes. Costs and labour were expensive. May be difficult to implement in low- and middle-income countries.	*Simkin-Silverman et al. 1995 (285) Simken-Silverman et al. 2003 for long-term evaluation 284 Kuller et al. 2001 (263)*

individual sessions as required for those with adherence difficulties.					
California latino 5-a-day campaign - California, USA - Adults (IG=338, CG=337) - 4 months with before and after test - Aimed at increasing F&V. ***Activities*** - Multimedia, advertising at flea markets and stores and on the radio - Used community health leaders to meet cultural needs.	**Effective** Significant improvement in awareness, feelings and intention regarding F&V intake.	**Effective** Significant increase in F&V intake in the Spanish-speaking community.	**Not reported/not measured**	The study emphasized the importance of designing campaigns that address the cultural needs, norms and lifestyles of the community targeted.	*Backman and Gonzaga 2003 (228)*
Diet and physical activity modification programme - Rockford, USA - Adult volunteers aged 43–81 years (IG=180, CG=186) - 4 weeks: 4 times a week for 2 hours. Retest at 6 weeks - Aimed at changing chronic disease risk factors - Based on principles of behavioural change. ***Activities*** - Teaching importance of making healthy lifestyle choices and improving diet and PA using the CHIP programme - Home assignments	**Effective** Health knowledge improved significantly.	**Effective** Most diet variables and total steps (PA) per week improved significantly.	**Effective** Improved percentage body fat, resting heart rate, total cholesterol, low-density lipoprotein cholesterol, and systolic and diastolic blood pressure. CG also experienced some significant improvements but less than IG.	For most variables, the IG showed significantly greater improvements than the CG. Large beneficial changes were observed in health behaviour and risk factor levels. However, it is important that such a programme be evaluated over a longer period than 6 weeks and such results were not available at the time of the review.	*Aldana et al. 2005 (172, 222)* *Englert et al., 2004 (247)*

- Supermarket tours - Weekly lectures by dieticians and other health professionals.					
Callers to the Cancer Information Service studies - USA - Adults calling the centre - Retesting after 4 weeks (n=1307), 4 months (n=1180) and 12 months (n=1016) in the replication study - Aimed at increasing F&V intake - Based on transtheoretical model, theory of reasoned action and social cognitive theory. ***Activities*** - Callers to the Cancer Information Service received a brief proactive educational intervention at the end of the usual service - 2 follow-up mails - Information from the *NCI 5-a-day for better health programme* was used.	**Moderately effective** The IG had better knowledge of the 5-a-day guidelines.	**Effective** There was a significant increase in self-reported F&V intake at 4 weeks and 4 months in both studies and at 12 months in the later study.	**Not reported/not measured**	May be replicated by organizations that provide services to low-income or low literacy populations who rely on telephone contact as part of their service. The majority of callers in the present study were Caucasian females of higher socioeconomic class. Hence it may be more difficult to reach low-income minority groups in this manner.	*Marcus et al. 1998 for 4 month survey (266)* *Marcus et al. 2001 For replication and 12 month evaluation (267)*
Physical activity and nutrition programme - Perth, Australia - Couples living together for less than 2 years (IG1=35, IG2=34, CG=38) - 4 months and follow-up at 1	**Effective** Perceived importance of barriers to dietary change decreased significantly in both IGs. Dietary	**Effective** Intake of high-fat and take-away foods decreased significantly while intake of F&V and PA increased	**Moderately effective** Significantly lower cholesterol and trend to lower weight gain which was maintained	Strategies that encourage goal setting, time management and overcoming perceived barriers to change were better predictors of behavioural change than	*Burke et al. 2003 (231)* *Burke et al. 2004 for cognitive measures (232)* *Dzator et al. 2004 For cost analysis*

year - Aimed at inculcating a healthy diet (decreased fat and increased F&V) and PA programme - Based on behavioural change and goal setting theory. ***Activities*** - 2 arms: (1) IG1=low-level group: modules were mailed, (2) IG2=high-level group: half the modules were mailed and half were delivered in interactive group sessions.	self-efficacy increased by 3% and 12% respectively. Changes in self-efficacy and perceived barriers predicted diet and PA behaviours.	significantly. After 12 months PA and dietary fat reduction were sustained. When comparing methods of delivery it was found that fat intake decreased more in IG2.	after 12 months. When comparing methods of delivery it was found that in IG2 low-density lipoprotein cholesterol decreased more and fewer participants became overweight or obese.	increasing knowledge. Estimated costs of the interactive group was only 3¢ more per participant per month than the group receiving the programme mainly by mail. The interactive intervention was more cost-effective showing a lower cost per unit improvement.	*(245)*
SNAP (Stanford Nutrition Action Programme) - San Jose, California, USA - Low literacy, low-income adults, 85% women (IG=183, CG=168) - 6-week classroom intervention and 12-week maintenance programme (retesting at 5 months from baseline) - Aimed at decreasing dietary fat intake - Based on social learning theory. ***Activities*** - 24 adult education classes (vocational and general education training sites) - IG received new dietary fat curriculum (SNAP) taught by	**Effective** IG showed significant improvements in diet knowledge, attitudes to eating a low-fat diet and self-efficacy for achieving a low-fat diet.	**Moderately effective** Significant decrease in percentage calories from total (–2.3%) and saturated (–0.9%) fat in IG from baseline to follow-up. No significant difference between IG and CG at retests.	**Not shown to be effective** No significant difference in BMI or blood cholesterol at follow-up.	A curriculum tailored to the cultural, economic and learning needs of low literacy, low-income adults was slightly more effective in achieving fat-related diet changes than a general diet curriculum. Those with higher baseline dietary fat may benefit from more intensive or longer term interventions.	*Howard-Pitney et al. 1997 (259) Winkleby et al. 1997 for factors that predict achievement of a low-fat diet (293)*

professional diet health educators - CG received existing general diet curriculum taught by paraprofessional diet educators - Maintenance comprised support and encouragement by telephone or mail contact.					
Take five: nutrition education intervention - Reading and Glasgow, United Kingdom - Adults (n=125, IG=101, CG=24), aged 16–65 years eating less than 5 F&V a day and contemplating increasing F&V intake - 8 weeks with post-tests at 6 and 12 months - Aimed at increasing F&V intake to 5 servings a day. ***Activities*** - Educational methods: lecture and leaflets - Motivational approaches such as fridge magnets and recipes - Behavioural methods such as a self-monitoring diary.	**Not reported/not measured**	**Effective** F&V intake increased significantly. Decrease in % E from fat for subjects who had high-fat intakes at baseline. Follow-up for self-reported measures at 6 and 12 months indicated mean intakes of F&V remained significantly higher than baseline.	**Not shown to be effective** Body weight did not change significantly.	This intervention showed positive outcomes with relatively few human resources. Only one educational lecture was held.	*Cox et al. 1998 (238)*
Women's health trial feasibility study in minority populations - Atlanta, Georgia; Birmingham, Alabama;	**Not reported/not measured**	**Effective** Fat intake was reduced from 39.7% E to 26.4% E, a	**Not reported/not measured**	Nutritionists delivered the programme and provided individual attention to those who had difficulties in making	*Coates et al. 1999 (236)*

Miami, Florida; USA - Post-menopausal women (n=1490), aged 50–79 years - 2 years with post-tests at 12 and 18 months - Aimed at decreasing dietary fat and increasing F&V. ***Activities*** - Group sessions: weekly for 6 weeks, every two weeks for 6 weeks, monthly for 9 months, then quarterly - Diet and behavioural change strategies and personalized fat (gram) goals - Individual sessions for those with difficulties making changes.		reduction of 13.3% E compared with 2.3% in CG. Significant decreases in saturated fat and cholesterol and increases in F&V intake.		changes.	
Dietary intervention in an aboriginal community - Kimberly region, Western Australia - Adults (1994=199, 1996=181, 1997=124) - Ongoing intervention since 1993 for 4 years and evaluated at 2-year intervals - Aimed at reducing coronary heart disease risk through dietary intervention (decreasing saturated fat and sugar and increasing F&V intake). ***Activities*** - Store changes - Health promotion activities	**Not reported/not measured**	**Moderately effective** There was an increase in the supply of fresh F&V at the local store.	**Effective** Significant reduction in the prevalence of hypercholesterolemia from 31% at baseline to 15% at year 4. Significant increases in plasma concentrations of alpha-tocopherol, lutein, zeaxanthin and beta-carotene across the population. Mean plasma homocysteine	This dietary intervention reduced the prevalence of coronary heart disease risk factors related to diet and PA in collaboration with members of the community.	*Rowley et al. 2001 (281)*

- Regular exercise classes - Diet education to high-risk individuals by diabetes nurse educator.			concentration decreased.		
Weight loss programme using computer and staff consultations - New York, USA - Adults with BMI >25 plus 1 CVD risk factor (IG1=97, IG2=183, IG3=194) - 12 months with retest at 12 months - Aimed at decreasing CVD risk factors by weight loss and lifestyle modification including diet and PA - Cognitive behavioural approach based on transtheoretical model. ***Activities*** - IG1=Workbook alone - IG2=Workbook and computer - IG3=Workbook and computer and staff consultations with dieticians: 6 group sessions plus individual consultations.	**Not reported/not measured**	**Effective** All groups reported a decrease in calories and fat. All groups also reported a mean increase in walking time.	**Moderately effective** All groups had significant weight loss at one year and IG3 had an increase in high-density lipoprotein and a decrease in diastolic blood pressure.	Interventions that correlated best with weight loss were: more computer log-ons, more self-monitoring, achieving computer goals, increased walking, decreased energy and fat intake. Cost per participant over 12 months was US$ 12.33, US$ 41.99 and US$ 133.74 for IG1 to IG3 respectively.	*Wylie-Rosett et al. 2001 (294)*
Dietary intervention to decrease consumption of fat and increase consumption of fruits and vegetables - Portland Oregon, USA	**Not reported/not measured**	**Effective** There was a significant decrease in self-reported fat intake and significant	**Minimally effective** Change in total cholesterol at 12 months in desired direction but not	Sessions were conducted by health counsellors having a masters degree. Moderate intensity intervention using	*Stevens et al. 2002 4 month follow up (288)* *Stevens et al. 2003- 12 month follow up (289)*

- Adult women aged 40–70 years (IG=277, CG=271) - 6–9 weeks with follow-up at 4 and 12 months - Aimed at increasing F&V and decreasing fat intake - Based on social cognitive theory, problem solving and motivational interviewing. ***Activities*** - Two 45-minute counselling sessions including a 20-minute interactive computer-based intervention - 2 follow-up telephone contacts.		increase in F&V intake at both 4 and 12 months. Same applied to behavioural measures of fat intake.	significantly different to CG.	motivated subjects.	
Metroville health study - Pakistan - Lower middle class urban households (IG=199, CG=201) - Post-test 2 years after baseline - Aimed at reducing consumption of total cooking fats by 33%, salt by 25% and replacing ghee with vegetable oil. ***Activities*** - Health fairs and lectures - 6 household visits and 8 maintenance visits by social workers who counselled the household's women.	**Not reported/not measured**	**Effective** Intervention households significantly reduced consumption of total fat, ghee, vegetable oil and salt.	**Not shown to be effective** No significant changes were noted in blood pressure, BMI and total cholesterol.	It may be more cost-effective to use health educators than social workers to carry out health promotion.	*Aziz et al. 2003 (227)*

Internet-based intervention - Glasgow, United Kingdom - Healthy females in 2 universities (IG=53, CG=19) - 6 months with post-test - Aimed at promoting Mediterranean diet - Based on Weinstein's precaution adoption process model. ***Activities*** - Tailored dietary and psychosocial feedback - Internet education via an innovative Mediterranean eating web site.	**Not reported/not measured**	**Moderately effective** Those in the IG significantly increased their intake of F&V and the monounsaturated to saturated fat ratio in their diet.	**Moderately effective** Those in the IG significantly increased their plasma high-density lipoprotein cholesterol levels and had a reduced ratio of total high-density lipoprotein cholesterol.	This Internet programme holds promise of encouraging a greater intake of plant foods. However, Internet access is a prerequisite. Since the sample was relatively small it would need to be tested in a bigger group and over a longer time period.	*Papadaki and Scott 2005 (276)*
Smart shoppers tours - Dallas, USA - Mothers with limited income (IG=114) - Post-test 2 months after tours - Aimed at improving attitudes, self-efficacy, knowledge and behaviours of purchasing healthier foods - Based on theory of planned behaviour and self-efficacy. ***Activities*** - 3 supermarket tours by trained community peer workers (peers were trained over a 5-week period).	**Moderately effective** Significant increases were noted in knowledge, self-efficacy, attitudes and intentions.	**Moderately effective** Some significant improvements in healthy shopping behaviours and self-reported behavioural changes.	**Not reported/not measured**	The tours were found to be labour-intensive and expensive compared to classroom sessions (US$ 15 versus US$ 3). The researchers recommend one in-store tour linked with several classroom sessions.	*Carson and Hedl 1998 (235)*

Nutrition for a Lifetime System - Virginia, USA - Mainly Caucasian females (IG=129, CG=148) - 15 weekly sessions and post-test 4–6 months later - Aimed at reducing fat and increasing F&V intake of shoppers - Based on social cognitive theory. ***Activities*** - Self-run computer program that used tailored information and self-regulation strategies. Housed at kiosks in supermarkets - Participants also received targeted food coupons.	**Moderately effective** There were higher levels of diet related self-efficacy, physical and social outcome expectations.	**Moderately effective** Levels of fat, fibre and F&V intake improved (significant difference between the IG and CG).	**Not reported/not measured**	This study has important implications for policy and future strategies, and seems a cost-effective way to reach many participants in an important setting.	*Anderson et al.2001 (223)*
Talking computer **-** Massachusetts, USA - Adults who were sedentary with a suboptimal diet (n=114, IG=70, CG=44) - 6 months plus follow-up - Aimed at improving F&V intake and decreasing fat intake - Based on social cognitive theory and stages of change. ***Activities*** - Communication via an automated computer voice-based system - Participants telephoned in.	**Moderately effective** IG had significantly greater progress in stages of change than the CG for fruit and whole grain foods.	**Moderately effective** Overall dietary score, fruit and fibre intake increased significantly. Saturated fat intake decreased significantly.	**Not reported/not measured**	The need to have a computer may not be appropriate for low- and middle-income countries. However, computer technology has the potential to reach a large group.	*Delichatsios et al 2001 (241)*

The computer monitored diet habits and provided feedback, advice and behavioural counselling - CG received PA counselling.					
Eat well live well nutrition programme - USA - African-American women aged 25–55 years with BMI >27 (n=294, IG=138 and CG=156) - 3 months plus follow-up - Aimed at decreasing dietary fat intake - Based on stages of change model. ***Activities*** - 6 group sessions and 6 individual sessions (tailored) with peer educators who were trained by professionals.	**Moderately effective** IG showed greater readiness to change dietary patterns. Also significantly increased knowledge of dietary fat and skill-based knowledge.	**Moderately effective** Significant improvement in dietary patterns (energy, percentage energy from fat and percentage saturated fat intake).	**Not shown to be effective** No significant differences in weight or BMI.	This was a culturally specific peer-led dietary change programme. Peer educators from within the target community were trained by a team of dieticians, social workers and health educators over 4 months. This peer-led programme was delivered in the community and tailored to the participants' stage of change for individual dietary patterns.	*Auslander et al. 2002 (226)*
Newsletter intervention - North Carolina, USA - Adults (n=573) who were members of a health maintenance organization - 4 months with follow-up at 6 months - Aimed at increasing F&V intake - Based on social cognitive theory, stages of change,	**Not reported/not measured**	**Moderately effective** All IGs had significantly higher F&V servings/day compared with the CG. No significant differences between IGs although trend of improved intake	**Not reported/not measured**	Nutritionists and health educators wrote the newsletters. This was a cost-effective way to reach many literate adults, but needs to be tested over a longer period.	*Lutz et al. 1999 (265)*

health belief model and goal setting theory. ***Activities*** - 3 IGs received 1 newsletter a month: (1) non-tailored newsletters, (2) computer-tailored newsletters, and (3) tailored newsletters with tailored goal-setting information, plus a CG.		and variety with each added newsletter element.			
Puget Sound Eating Patterns study - Washington, USA - Adults (n=1205), aged 18–69 years from a health maintenance organization - 12 months with evaluation at 3 and 12 months - Aimed at decreasing fat and increasing F&V consumption - Based on social learning theory and transtheoretical stages of change model. ***Activities*** - Computer-generated personalized letter - Motivational telephone call - Self-help manual and supplementary materials - Computer-generated behavioural feedback - Newsletters.	**Minimally effective** More likely to move from pre-action into action or maintenance stages of change at 3 months follow-up.	**Moderately effective** Fat intake was significantly reduced. Significant increase in F&V intake at 3 and 12 months.	**Not reported/not measured**	This intervention was most effective among those who were already interested in healthy diet change. A trained health educator made the motivational telephone calls. Cost analysis was based on delivery to 2500 people/year and excluded costs for evaluation and materials development. Costs for those completing all intervention activities were about US$ 57. A scaled-back intervention with a baseline arm, tailored self-help package and diet arm with feedback was about US$ 37.	*Kristal et al. 2000 201 or (262)*
Education programme for pre-menopausal women - Illinois, USA	**Promising/insufficient evidence** Significant	**Minimally effective** IG noted	**Not shown to be effective** No differences	Professional diet educators/dieticians were used. This	*Miller et al. 2001 (272)*

- Rural pre-menopausal women (IG=174, CG=103) many with at least 1 CVD risk factor - 2 years plus follow-up - Aimed at assessing CVD risk before and after an educational intervention. Diet focused on fat reduction. ***Activities*** - 6 group sessions in first 6 months - Alternate mail and telephone contacts in second 6 months - 4 follow-up group sessions in year 2.	differences were noted between baseline and 6 months for knowledge of general diet, general health and fat in the IG. Significant differences were noted in the CG for general diet and fat knowledge.	decreased fat intake at 6 months in those consuming over 30% fat at baseline. No differences across time for CG. PA increased in CG and IG.	over time in BMI, waist-hip ratio and body fat in either group .	community intervention can be successful if personal contact and follow-up is maintained.	
Nutritional intervention promoting a Mediterranean food pattern - Quebec, Canada - Adult females (n=73) - 12 weeks plus follow-up - Aimed at promoting a Mediterranean food pattern in order to decrease plasma lipid levels and weight status. ***Activities*** - 2 group sessions, 3 individual sessions and 4 telephone interviews with a dietician.	**Not reported/not measured**	**Moderately effective** The Mediterranean pyramid score increased significantly. Significant decrease in energy, and total and saturated fat intakes. Significant increase in fibre and monounsaturated fatty acids to saturated fatty acids ratio. May become good	**Promising/insufficient evidence** Small but significant decrease in total cholesterol, waist circumference and BMI. No significant change in lipoprotein cholesterol levels.	A dietician administered the intervention which may not be cost-effective if undertaken on a population basis. Health benefits were greater in women that had a worse metabolic profile at baseline. No long-term effects measured.	*Goulet et al. 2003 (252)*

		practice in the longer term.			
High 5, low-fat programme - St. Louis, USA - African-American parents (IG=406, CG=325) in 12 school districts - 1 year with follow-up - Aimed at decreasing fat and increasing F&V intake. ***Activities*** - 5 home visits - 10 parent-child newsletters and group meetings - Ecological approach and social cognitive theory used.	**Not shown to be effective** Improvements in parental modeling were not statistically significant.	**Moderately effective** F&V intake significantly increased in IG. A higher proportion of parents in IG reduced their intake to less than 30% calories from fat and improved performance of dietary behaviours.	**Not reported/not measured**	The programme used a community participatory approach and was designed with dissemination as a priority. Parents were trained to be teachers for their children. The programme was delivered by trained parent educators.	*Haire-Joshu et al. 2003 (254)*
Little by little CD-ROM - California, USA - Low-income females (IG1=160, IG2=162, CG=159) 75% of whom were obese - Single intervention, evaluated after 2 months - Aimed at increasing F&V intake - Based on stages of change model. ***Activities*** - Group 1: One-time experience Little by little CD-ROM - Group 2: Little by little CD-ROM plus 2 reminder telephone calls	**Promising/insufficient evidence** Greater movement in stage of readiness for change in IGs versus CG but only IG2 was significant.	**Moderately effective** Significantly higher F&V intake in IGs over CG. Highest intake in IG2.	**Not reported/not measured**	The success of the CD-ROM was attributed to baseline screening and immediate feedback, including individual selection of topics of interest. The intervention was carried out in small, easy steps with goal setting. Computer access is required, which is not always feasible for low-income groups. Needs to be evaluated over a longer period of time.	*Block et al. 2004 (229)*

- Group 3: Control. Stress management CD-ROM.					
Hartslag Limburg - Maastricht, Netherlands - Persons over 14 years (IG=505, CG=392) - 3 years with post-tests at 2 and 3 years - Aimed at reducing high fat intake, decreasing prevalence of smoking and increasing PA - Based on social network approach and environmental strategies. ***Activities*** - Participation - Intersectoral collaboration - Multimedia and multi-methods strategies - 9 local health committees set up, each with a health educator, social worker and a municipality administrator.	**Promising/insufficient evidence** Lower self-efficacy expectations towards decreasing their fat intake were found in the IG. At first post-test, attitude and self-efficacy to increase PA were more positive among respondents who were familiar with the health project.	**Moderately effective** There was a significant effect on fat reduction, especially among respondents < 48 years.	**Not reported/not measured**	With regard to the intensity of the intervention and the amount of resources used, results were not as good as expected.	*Ronda et al. 2004 (278)*
Healthy heart store tours - Sainsbury stores across the United Kingdom - 180 health tours in 150 stores (n=459 consumers who completed an evaluation after the tour) - Aimed at fat and cholesterol reduction and increased F&V - Based on point-of-purchase behaviour.	**Promising/insufficient evidence** 41% of dieticians felt the tours were very effective and 25% felt they were fairly effective in educating consumers about a healthy heart.	**Promising/insufficient evidence** Purchase of low-fat healthier spreads and cholesterol lowering spreads increased.	**Not reported/not measured**	Trials are required over longer periods. This innovative initiative could be used by the food industry to increase consumption of healthy products.	*Sadler et al 2003 (282)*

Activities - Supermarket tour of 45–60 minutes - Presentation by dietician of 15 minutes - Question and answer session - Tasting of low-fat healthier spreads and cholesterol lowering spreads - Diet literature.					
Food cent$ pilot project - Western Australia, Australia - Low-income adults, mostly female (n=373, advisers, n=150) - 4 sessions of 1.5 hours with follow-up at 6 weeks and 4 years - Aimed at showing low-income adults how to allocate food budget to obtain a healthy diet - Based on the Precede-Proceed planning framework. ***Activities*** - 4 sessions: (1) adviser training, (2) budget, (3) cooking, and (4) supermarket tour - Included resources that addressed barriers to healthy eating and group activities.	**Not reported/not measured**	**Insufficient evidence/ promising** Positive changes were noticed in diet, cooking and shopping behaviours, which remained at 4-year follow-up.	**Not reported/not measured**	Community volunteers (advisors) were trained to deliver the project within their community networks, which is a cost-effective method of programme delivery. A dietician conducted the supermarket tours.	*Foley and Pollard, 1998 (250)*
Implementation intentions to reduce dietary fat intake - Sheffield, United Kingdom	**Not reported/not measured**	**Promising/insufficient evidence** After 1 month, fat	**Not reported/not measured**	This used implementation intentions rather than	*Armitage et al. 2004 (225)*

- Adults (n=264, randomized to IG and CG) - One-off intervention with post-test after 1 month - Aimed at decreasing fat intake. ***Activities*** - Formation of implementation intentions in IG.		intake, saturated fat and % E from fat decreased significantly in the IG but not in the CG.		tailored interventions to change behaviours in the general population.	
Mujeres felices por ser saludables - Chicago, USA - Latino women (IG=127, CG=129) aged 20–40 years - 8-month dietary and breast health intervention plus follow-up - Aimed at reducing fat and increasing fibre intake. ***Activities*** - Multi-component education programme designed specifically for Latino women - CG received mailed health education material.	**Not reported/not measured**	**Promising/insufficient evidence** At 8 months, significantly lower dietary fat and higher fibre intake were reported in the IG.	**Not reported/not measured**	The intervention achieved dietary change as well as improving breast health behaviour.	*Fitzgibbon et al. 2004 249*
Cooking classes - 28 counties, Oklahoma, USA - n=602 (229 youth and 373 adults) - 2 months plus post-test - Aimed at increasing F&V intake and improving food safety - Knowledge based theory. ***Activities***	**Not reported/not measured**	**Moderately effective** Significant self-reported increase in F&V servings in both youth and adults. Significant improvement in food handling procedures.	**Not reported/not measured**	The classes were run by trained educators.	*Brown et al. 2005 (230)*

- 8 cooking classes (tasting, new recipes, new cooking methods, food safety).					
Sisters in health - New York, USA - Low-income women (IG=32, CG=10 groups, n=269) - 6 weeks with post-test - Aimed at increasing F&V intake - Based on active learning approach. ***Activities*** - Diet education programme of six 90-minute weekly meetings - Included active food experiences, positive social settings, a flexible meeting series and small group facilitation.	**Not shown to be effective** No significant difference was noted for knowledge, beliefs and attitude score.	**Moderately effective** Significant increase in F&V intake was reported in the IG, who are 0.44 times more likely to eat 5 or more F&V a day, than CG.	**Not reported/not measured**	Community diet paraprofessionals delivered the intervention to small groups. Taste, positive experiences with food and social support were central to this programme.	*Devine et al. 2005 (242)*
Stamp smart - Durham, North Carolina, USA - Low-income women with children or who were pregnant, enrolled in the Food stamp programme, primarily African-Americans (IG=165, CG=212) - One-time 30-minute multimedia programme and post-test 1–3 months after baseline - Aimed at reducing fat intake and increasing knowledge - Based on social cognitive	**Promising/insufficient evidence** Knowledge, stages of change and certain eating behaviours significantly improved. Increase in self-efficacy immediately post programme but not sustained at follow-up.	**Promising/insufficient evidence** Both groups lowered fat intake markedly but did not differ significantly among themselves.	**Not reported/not measured**	Multimedia may be more beneficial than print for those with limited literacy skills. Combining interactive education with entertainment preferences may be an effective way to interest and motivate lower income and minority audiences to participate in health promotion activities.	*Campbell et al 1999 (234)*

theory and stages of change transtheoretical model. ***Activities*** - A tailored soap opera video and interactive "info-mercials" that provided individualized feedback about fat intake, knowledge and strategies for lowering fat - CG received no diet education.					
FRESH (Farm Resources Encouraging and Supporting Health) - Michigan, USA - Adult low-income women participating in a special supplementation diet programme and from Community Action Agency populations (n=455, IG1=123, IG2=114, IG3=121, CG=97) - One-off intervention with follow-up at 2 months - Aimed at increasing F&V intake - Based on stages of change model. ***Activities*** - 4 arms: IG1=Education about use, storage and nutritional value of F&V (20-minute session) IG2=Distribution of farmers market coupons IG3=Education and coupons	**Moderately effective** Coupons had no effect on attitudes and beliefs about F&V, whereas education had a direct and significant effect.	**Moderately effective** Coupons increased F&V consumption. Education appeared to have an effect on F&V consumption through attitudes.	**Not reported/not measured**	Maximum impact of the intervention was achieved through a combination of education and use of coupons. Participants in the two groups that received education were more likely to say they had heard the phrase *5-a-day for better health.* Participants who received coupons were more likely to report visiting the farmers market during the preceding 2 months.	*Anderson et al 2001 (224)*

CG=No intervention.

WIC (Special Supplemental Nutrition Programme for Women, Infants and Children) 5-a-day promotion programme - Baltimore City and 6 Maryland counties, USA - 16 programme sites, low-income women aged over 18 years (IG=1443, CG=1679) - 6 months and post-test at 12 months - Aimed at increasing F&V intake - Based on Prochaska and DiClemente's stage model of change. ***Activities*** - 3 components: (1) 3 diet sessions conducted by peer educators, (2) printed materials and visual reminders, and (3) direct mail, tailored letters and information - CG=Usual 10-minute WIC diet education every two months.	**Moderately effective** Significant improvement was seen in stages of change, knowledge, attitudes and self-efficacy.	**Moderately effective** Significantly increased F&V by 0.56 servings at 2 months post-intervention. At 12 months post-intervention both groups increased F&V by an additional 0.27 serving. Significant changes only among Caucasians and those with at least a high school education.	**Not reported/not measured**	The use of trained peer educators for diet sessions seems an innovative approach that may be more cost-effective than traditional methods. 46% did not attend any diet session, which impeded increased F&V intake, as changes in consumption were closely related to the number of diet sessions attended. It seems that interventions need to provide specific, concrete messages such as "consume 5 or more servings a day" rather than "consume more servings a day". They also may need to focus on the strongest predictors of consumption: self-efficacy, perceived barriers and attitudes.	*Havas et al 1998 (257)* *Havas et al 1998 for factors associated with F&V consumption (256)*
Expanded Food and Nutrition Education Programme (EFNEP) - 16 Tennessee counties, USA - Adult women (n=371, IG1=121, IG2=129, CG=121)	**Not reported/not measured**	**Moderately effective** Individuals reduced food expenditure and increased intake of iron, vitamin C,	**Not reported/not measured**	Results indicated that the participants learnt to use their resources more wisely. Those who kept a shopping list, estimated expenditure from recall and had	*Burney and Haughton 2002 (233)*

- Aimed at improving the nutritional well-being of low-income women - Costs of the programme calculated over 6 months. ***Activities*** - 3 arms: IG1: Education plus food receipts IG2: Education plus cost recalls CG: Control group.		vitamin B6 and fibre. They also added less salt in cooking.		received education saved significantly more on their food expenditure than those who did not. Programme participants saved US$ 124 to US$ 234 per year.	
Effectiveness of audio communications - Massachusetts, USA - Regular shoppers (IG=3 stores, n=328, CG=3 stores, n=354) - 4 weeks followed by post-tests - Aimed at increasing F&V intake - Based on the consumer information processing model. ***Activities*** - Two 1-hour audio-tapes to take home (on diet knowledge and F&V preparation) - In-store public announcements on F&V every 30 minutes for 4 weeks.	**Moderately effective** Overall knowledge scores increased significantly in the IG. No significant improvement in attitudes and beliefs.	**Minimally effective** Self-reported F&V intake increased significantly in both groups, although it was greater in the IG.	**Not reported/not measured**	This seems a cost-effective way to reach many participants in an important setting. The authors believe that most improvements were as a result of the audio-tapes and that these should be explored further.	*Connell et al. 2001 (237)*

Family fitness programme - California, USA - Targeted third grade children (n=238) from 6 elementary schools (IG=142, CG=96) - 20 weeks - Aimed at modifying CVD risk behaviours. ***Activities*** - Diet (two 30-minute lessons/week) and exercise programme (three 30-minute lessons/week) - Parent programme: guided home activities.	**Minimally effective** There was significantly higher PA and diet knowledge. Difference in knowledge did not persist in follow-up at year 1.	**Moderately effective** Total fat intake was significantly reduced from 59.67 g to 57.05 g.	**Not shown to be effective** No improvement in cholesterol, BMI or skinfolds.	Teachers were trained to administer the intervention. Consistent programmes emphasizing PA and diet may be necessary throughout the grades to solidify behavioural changes.	*Hopper et al. 2005 (108, 258)*
Tailored dietary feedback - Ghent, Belgium - 2-parent families with two 12–18 year adolescents (IG=18 families, n=72, CG=17 families, n= 68) - Intervention letters sent 2 weeks after baseline. Post-tests at 4 weeks after feedback letters - Aimed at reducing fat and saturated fat intake. ***Activities*** - Individually tailored diet education letters to each family member simultaneously - CG received standard diet information.	**Minimally effective** Tailored feedback resulted in stronger awareness of personal fat intake and that of family members.	**Minimally effective** The intervention was more effective in reducing the fat and saturated fat intake of the family members.	**Not reported/not measured**	Research is needed to clarify if tailored interventions are more effective than standard interventions and than those focusing on a single person. When there are few differences, the cheaper and more time-efficient standard method would be more feasible.	*De Bourdeaudhuij and Brug 2000 (239)*

Implementation intentions - Netherlands - Adults (n=535, IG=335, CG=200) - 1 week and post-test - Aimed at increasing fruit intake. ***Activities*** - Adults were instructed to make implementation intentions (when, where and what) to eat 1 extra serving of fruit per day during 1 week.	**Minimally effective** Commitment to implementation intentions was positively associated with fruit intake level and with a higher self-assessed change.	**Minimally effective** No significant impact of implementation intentions was noted on fruit intake. However, a significant implementation intention effect was found on the number of days an extra fruit was eaten.	**Not reported/not measured**	Although the study had some positive outcomes it may not work in all types of community.	*De Nooijer et al. 2006 (240)*
Language for health - San Diego, USA - Latino students with with low literacy in English, aged over 18 years (n=526) - 2 weeks of five 3-hour lectures. Post-tests at 3 and 6 months - Aimed at heart/health diet education - Based on social learning and operant theories. ***Activities*** - Lectures given by trained teachers - IG=diet education - CG=stress management classes.	**Minimally effective** Diet knowledge and fat avoidance scores were higher in the IG than the CG at 6 months.	**Not reported/not measured**	**Minimally effective** Only short-term effects were seen on total cholesterol, high-density lipoprotein ratio and systolic blood pressure.	The intervention used language teachers to promote diet, an innovative way to approach health promotion. However, the IG and CG were housed in the same building and their teachers at the same school. Some confounding may therefore have taken place since there were many improvements in the CG as well.	*Elder at al. 2000 (246)*
Help Yourself to Health-Expanded Food and Nutrition Education	**Minimally effective** Positive changes	**Minimally effective** Changes in fat	**Not shown to be effective** Total blood	The sessions were delivered by trained paraprofessionals (diet	*Hartman et al 1997 (255)*

Programme participants - Twin Cities, USA - Mainly women with low literacy skills and limited income (IG=130, CG=70) - 10 sessions and post-test 8 weeks after baseline - Aimed at promoting a low-fat, healthy diet. ***Activities*** - IG received a low-fat diet curriculum by diet education assistants - CG received the usual Expanded Food and Nutrition Education Programme materials.	occurred in eating attitudes. No significant effect in overall attitude score to low-fat eating.	intake suggested a positive intervention effect with a positive overall eating pattern score. Significant intervention-related changes in 4 of the 10 specific eating behaviours.	cholesterol values were in an acceptable range at baseline. No significant differences compared with the CG.	education assistants who live in the same community as the subjects). This can be regarded as more cost-effective education than using professionals.	
HomePlate pilot study - 10 counties, North Carolina, USA - Parents of children aged 5–8 years (n=99 adults, mostly women) - A one-off kit, evaluated 3 weeks after delivery - Aimed at providing diet education at home in a comprehensive kit. ***Activities*** - Included a video with 4 short lessons - A newsletter for the parents with recipes and important diet information related to children's diet.	**Not reported/not measured**	**Minimally effective** 54% of parents reported changing some of their eating practices. 30% reported changing cooking practices.	**Not reported/not measured**	This may be a cost-effective way to provide diet education at home to people who are literate and have the means to watch videos.	*Dunn et al. 1998 (244)*

Research-based intervention promoting fruit and vegetable consumption - United Kingdom - Psychology students (n=416) - One-off intervention with post-test immediately after completion of task - Aimed at increasing F&V intake to over 5 a day - Based on theory of planned behaviour. ***Activities*** - Leaflet with information and persuasive messages targeting self-efficacy and behavioural intention - The IG were then asked to plan and record their F&V for 1 week - CG answered questions about the questionnaire itself.	**Promising/insufficient evidence** The IG had stronger intentions to consume at least 5 portions of F&V a day, and showed higher anticipated regret if failing to do so.	**Promising/insufficient evidence** At follow-up of 1 week, the IG had consumed significantly more F&V and had more frequently attained 5 portions a day.	**Not reported/not measured**	This intervention has good potential in terms of cost and feasibility. However, it needs to be tested with a longer follow-up period and with different target groups.	*Kellar and Abraham, 2005 (260)*
Rite bite programme - Texas, USA - College students aged 14–21 years (n=189), many minority students - 3 years, results for year 1 - Aimed at increasing F&V intake and decreasing fat intake - Based on social cognitive theory for the framework. ***Activities***	**Promising/insufficient evidence** Students had higher knowledge scores at year 1, but no improvement in attitudes or outcome expectations.	**Promising/insufficient evidence** Compared with baseline results students reported eating less fat and more F&V. Unfortunately more healthy choices were not available at year 1.	**Not reported/not measured**	This programme was designed and implemented by students. Part of the lack of success may be due to management, who did not provide the healthier choices requested by students.	*Evans and Sawyer-Morse 2002 (248)*

- Use of trained peer educators (diet students)
- Small group presentations with personal follow-up
- Information tables, brochures and diet information in a newsletter
- Providing a healthy eating environment (healthy choices and diet information available).

Community-based (physical activity)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
Pasos adelante/steps forward - USA - Ethnic minority community - n=248. ***Activities*** - 12 weeks with lectures and walking group - Weekly classroom sessions - Weekly walking club.	**Not reported/not measured**	**Moderately effective** The number of participants walking increased, along with the number of minutes per week of moderate to vigorous exercise.	**Not reported/not measured**	The success of this intervention is attributed to the curriculum being culturally appropriate, the involvement of community leaders, and to its many components.	*Staten et al 2005 (287)* *www.borderhealthsi.org/steps_pasos.htm*
Kate B Reynolds SELF Improvement Programme - North Carolina, USA - Underserved, low-income communities - US$ 10 million trust, targeting healthy eating, smoking and inactivity - Individual community	**Effective** More than one million residents received information. More than 25 500 are personally engaged in a health behavioural	**Effective** Mean PA levels increased from baseline in more than 11 000 adults, and in 43 000 adolescents and children, at first and second follow-up.	**Moderately effective** Significant reduction in weight and BMI in adult participants.	This is an “example intervention” of community-based programmes: formative assessment, multiple strategies, evaluation, and issues of sustainability were and continue to be addressed. The community	*Sauer ML et al., 2006 (283)*

projects built on the resources, characteristics, culture and needs of the region - Targeted multiple levels (schools, community organizations, churches, and health care settings) - Reported on 15 projects - Based on the community participatory approach. ***Activities*** - Partnership between health department and schools - Peer health educators addressed school environment - Health screening, counselling on barriers to health in faith-based and community-based organizations - Increased access to health care.	change intervention.	F&V intake increased in adults and youth. Approximately 5% of adults changed smoking status.		participatory approach was used and programmes linked into existing infrastructure (schools, faith-based organizations, health-care services, service organizations).	
Web-based tailored intervention with "personal coach" for feedback - Short-term, web-based, tailored PA intervention - Population recruited via Internet from type 2 diabetes patients - Chat forum and interaction with personal "coach" via web.	**Not tested**	**Effective** PA behaviour increased the most in those who accessed the web site most frequently.	**Not tested**	A tailored intervention with interactive, personal coaching may be good practice for this medium, in particular in groups recruited via the Internet. However, it requires trained personnel for interaction.	*McKay et al., 2001 (270)*

INTERVENTUSA - USA - Non-physician-delivered therapeutic lifestyle counselling via the telephone and Internet - Comparing employee health and urban versus rural settings using either remote or on-site counselling.	**Insufficient evidence/ promising** Improvements were seen in self-reported physical functioning, vitality, social functioning, and general health.	**Not reported/not measured**	**Effective** Remote versus on-site delivery of lifestyle counselling on diet and exercise led to similar, significant and favourable changes in blood pressure, weight, and blood lipid profiles.	This form of lifestyle intervention may prove cost-effective for remote settings that nonetheless have technological resources.	*Grey literature with published abstracts* *http://www.interventusa.com (297)* *Arabatzis et al., 2002, Watson et al., 2002, Salmon et al., 2003, Hendrickson et al., 2005 (all published abstracts on URL)*
Internet-based PA Intervention in hospital employees - USA - Sedentary employees of several hospitals were recruited through print media, electronically or in person - n=65 randomized into 2 groups (IG and CG). ***Activities*** - Access to the web site for 3 months, with weekly e-mail tips - Web-based content used	**Moderately effective** A greater proportion of the IG reached the emotional readiness stage.	**Moderately effective** The IG reported more minutes of moderate PA and walking than the CG at 1 month. By 3 months, only walking minutes remained higher in IG.	**Not reported/not measured**	This programme demonstrated excellent retention with 80% of people remaining in the study up to 3 months. It further highlights the potential of web-based interventions to assist lifestyle change, for example in the workplace.	*Napolitano et al., 2003 (274)*

the transtheoretical model - Prompted with stage of change quiz every time they accessed web site - Outcomes at 1 and 3 months - Controls formed a waiting list.					
Internet and email based weight loss intervention - USA - Healthy but overweight, adult hospital employees (n=91), aged 18–60 years - Randomly assigned to a 6-month weight loss programme of either Internet education or Internet behaviour therapy. ***Activities*** - All participants were given 1 face-to-face group weight loss session and access to a web site with organized links to Internet weight loss resources - Behaviour therapy group received 24 weekly behavioural lessons via e-mail, weekly online submission of self-monitoring, diaries with individualized therapist feedback via e-mail, and an online bulletin board.	**Not reported/not measured**	**Not reported/not measured**	**Moderately effective** The behaviour therapy group lost more weight than the education group. More participants in the behaviour therapy than the education group achieved the 5% weight loss goal.	This intervention may be most effective in a specific and targeted population. Internet and e-mail appear to be viable methods for delivery of structured behavioural weight loss programmes.	*Tate et al,. 2001 (290)*

"Concord a great place to be active" - Sydney, Australia - n=1801 - 2 years - Targeted insufficiently active women aged 20–50 years - Aimed to increase PA by 4.5% - Based on principles of social marketing, capacity building and transtheoretical model. ***Activities*** - Community-based walking events - Walking maps, signage for walking routes, local newspaper articles, quarterly newsletter - Capacity-building strategies for local council - Community participation campaign.	**Minimally effective** Recall of campaign message increased from 9% to 51%. Little change in PA beliefs and non-significant decrease of participants in 'pre contemplation' stage of change (transtheoretical model).	**Moderately effective** The number of inactive women decreased from 22% to 15%. Increased prevalence of walking. No significant change in participation in moderate and vigorous PA.	**Not reported/not measured**	Focus group discussions including community members and council representatives assisted with the development of the campaign. The strong involvement of the local council played an important role in the success and sustainability.	*Wen et al 2002 (292)*
Computer-tailored, interactive programme for increasing PA - Belgium - Healthy adults (n=434) - Recruited from parents and staff of 14 primary and secondary schools - 6 months - Allocated into 1 of 2 IGs: (1) intervention with repeated	**Not reported/not measured**	**Moderately effective** Active transportation increased significantly (+20, +24, +11 minutes/ week in IG1, IG2 and CG respectively); and leisure-time PA (+26, +19, –4 minutes/ week).	**Not reported/not measured**	Although this web site based intervention, with a "tailored arm", was able to increase self-reported levels of PA when compared to no intervention, the high drop-out rate and low number of participants who received repeated feedback are major limitations. This study	*Spittaels et al., 2006 (286)*

feedback, (2) intervention without repeated feedback, and (3) a CG. ***Activities*** - Web site delivered PA intervention that provides participants with computer-tailored feedback.		Significant decrease in sedentary minutes on weekdays (–22, –34, +4 minutes/day respectively). No significant differences were found between either IG.		highlights the problem of engagement and retention for these types of interventions.	
CUPS-17 (Chennai Urban Population Study) - India, 2 communities - 91% response rate in 1998, 99% response rate in 2001 - n=479 in 1998, n=705 in 2001. ***Activities*** - Mass awareness campaign - Public lectures and video clips - Tailored to cultural background.	**Promising/insufficient evidence** The community committee felt empowered enough after the intervention to mobilize resources and build a park in 2002 with a walker's lane.	**Moderately effective** The prevalence of individuals reporting moderate levels of PA increased from 30% in 1996 to 47% in 2004. Overall prevalence of exercisers increased from 13% to 52%.	**Not reported/not measured**	This is a good example of a low- and middle-income country initiative, in which communities are empowered to prioritize PA through education, awareness and social mobilization.	*Mohan et al., 2006 (273)*
Tailored email hyperlinked to website and staged physical activity advice - E-mail targeting specific stage of change - Hyperlinked to web site providing advice and feedback - Compared to standard letters or print media - Online health risk appraisal and feedback.	**Not reported/not measured**	**Insufficient evidence/ promising** No change was seen in self-reported PA levels.	**Not tested**	This type of intervention may be effective in specific and targeted populations, largely by increasing readiness and reducing barriers to PA.	*Rovniak et al., 2005 (280)* *Hageman et al., 2005 (368)* *McCoy et al., 2005 (269)*

					Leslie et al., 2005 (277)
Culturally adapted lifestyle programme in an African-American-owned commercial gym - USA - 366 obese African-American women - 1-year free gym membership.	**Not reported/not measured**	**Promising/insufficient evidence** The sample retention was 71% overall.	**Moderately effective**	Groups improved in clinical measures after 1 year, suggesting that the economic incentive of free gym membership may be a more potent intervention than educational and social support alone.	*Yancey et al., 2006 (296)*
Dutch Heart Health "Hartslag: Limburg" - Netherlands - CVD prevention programme at an organizational level - Integrating community and high-risk strategy - Follow-up measurements after advocacy work (1998–2001).	**Not reported/not measured**	**Moderately effective** A significantly greater percentage of organizations was involved in at least one activity relating to PA compared to the CG. The number of activities related to healthy eating, smoking and PA was also higher in the IG region.	**Not reported/not measured**	There are no data on individual or community-level changes. However, this is an example of process evaluation where the outcomes of a consultative process are geared towards advocacy and intersectoral cooperation.	*Ronda et al. 2005 (279)*
Active Winners - 2 rural communities in South Carolina, USA - 18 months - 1 community received the intervention, the other served as CG - Public school students in	**Not reported/not measured**	**Insufficient evidence/not likely to be effective**	**Not reported/not measured**	Time constraints prevented the implementation of the planned home, school and community components of the intervention which translated to a lack of intervention fidelity.	*Pate et al., 2003 (277)*

fifth grade (558 at baseline) were eligible to participate. A total of 436 students participated over the course of the study. ***Activities*** - Included after-school and summer PA programmes and home, school, and community components designed to increase PA in youth.					
WHO Health Village Programme - Egypt, Malaysia, Nepal, Oman and Sri Lanka - Ethnic minority communities - Broad-based health education - Building community leaders.	**Not reported/not measured**	**Promising/insufficient evidence** Regular PA classes were implemented.	**Promising/insufficient evidence** Participants had a lower BMI than non-participants.	An evaluation of the intervention fidelity reveals that the success of the programme may be due to village culture.	*Kiyu et al 2006 (261)*
Coeur en santé St-Henri - Canada - n=849 - Heart health promotion project - Walking club and school, smoking, and diet components.	**Not reported/not measured**	**Minimally effective**	**Minimally effective**	As this programme is modelled on some historical good practices, further references should be sought.	*O'Loughlin et al 1995 (275)*
Healthy Weigh (El Camino Saludable) - Texas, USA - Obesity prevention programme for low-income, predominantly Hispanic and	**Not reported/not measured**	**Not reported/not measured**	**Not reported/not measured**	Process evaluation of phase 1 highlighted the need for clear roles for volunteers, paid staff and researchers. Funding is needed for upgrading and	*Frable et al., 2006 (251)*

African-American families - n=282 for phase 1. ***Activities*** - Phase 1: age appropriate classes for PA, family meals with table talks, age appropriate diet lessons.				facility repairs. More effective communication among partners, and more community participation in designing the programme – based on factors which prevent involvement at the outset – are priorities. There was effective and efficient data collection and management, with appropriate feedback, although more qualitative data are required. The potential benefits of this programme are recognized.	
Walking school bus - Australia, Canada, New Zealand and USA - Children walking to and from school under adult supervision - Involves parents as 'drivers' and sometimes a 'conductors' - Promotes safe, active transportation to and from school - Incorporates the concept of an annual "Walk safely to school" day.	**Promising/insufficient evidence** Walking to and from school promotes daily active living.	**Moderately effective** Walking to and from school increases the amount of PA.	**Not reported/not measured.**	Walking school buses are a widespread intervention. They appear to be so successful that in certain areas coordinators for the initiative are paid by local government.	*Merom et al., 2005 (271)*

Community leaders' programme - Japan - n=1252 - Community leaders' programme to promote healthy lifestyles - Train active-living ambassadors.	**Promising/insufficient evidence** Individuals interviewed were more satisfied with their health status.	**Promising/insufficient evidence** IG interviewees were more likely to seek health information and report being physically active, and have a healthy diet.	**Not reported/not measured.**	This programme has been suggested as an ideal mix of a mass messaging campaign supported by community leaders.	*Yajima et al 2001 (295)*

Primary health care (diet)

Intervention components	Outcomes			Policy/process implications	*References*
	Knowledge and attitudes	**Behavioural changes**	**Physical and clinical changes**		
Fruit and vegetable trial - Thame, Oxfordshire, United Kingdom - Healthy 25–64-year-olds (IG=344, CG=346) from 2 general practices in a health centre - 6 months with post-test - Aimed at increasing F&V to at least 5 a day - Based on the brief negotiation method. ***Activities*** - 2 individual counselling sessions by a nurse with leaflets and other materials given as needed - Telephone follow-up at 2 weeks - Mail (booklet and checklist) at 3 months.	**Effective** Effective in promoting stages of change. Significantly greater changes were reported in groups at all 3 stages.	**Effective** F&V consumption increased by a mean of 1.4 portions versus 0.1 portions in the CG ($P < 0.0001$).	**Effective** Plasma concentrations of carotene, b-carotene, lutein, b-cryptoxanthin and ascorbic acid increased significantly more in the IG. Diastolic and systolic blood pressure decreased significantly more in the IG.	Nurses conducting the trial were trained in the brief negotiation method. Decreases in blood pressure are expected to produce small clinical effects but substantially reduce CVD at population level. Overall this intervention can be regarded as reasonably cost-effective since the clients only had 2 visits. Women reported that children and male partners were obstructive to their attempts to eat more F&V, whilst men reported that women	*John et al. 2002 (331)* *John et al. 2003. (332)* *John and Ziebland 2004 for qualitative study of barriers (333)*

				were supportive of the change.	
OXCHECK study - Bedfordshire, United Kingdom - Adults attending 5 urban general practices (IG=1660 CG=1916) aged 35–64 years - 4 years with post-test at 3 years - Aimed at evaluating the effectiveness of annual health checks by nurses to decrease risk factors for CVD and cancer - Based on patient-centred communication model. ***Activities*** - Initial health check (45–60 minutes) and a follow-up check (10–20 minutes) every year for 3 years - CG only initial check - Every risk factor had a standard protocol with health promotion given by a trained nurse.	**Not reported/not measured**	**Moderately effective** Self-reported saturated fat intake was significantly lower in the IG along with decreased use of full cream milk and butter at 3 years. PA significantly increased in men. No significant differences were noted between groups regarding smoking and excessive alcohol use.	**Moderately effective** Total cholesterol was 3.1% lower in the IG versus the CG. Systolic and diastolic blood pressure were both 1.9% lower than the CG; and BMI 1.4% lower than the CG ($P < 0.005$). There was an average 3.9% difference in subjects with a cholesterol concentration of at least 8 mmol/l, but no significant difference in the number with diastolic blood pressure of at least 100 mmHg or BMI of at least 30 kg/m2.	The benefits of systematic health checks must be weighed against costs in relation to other priorities. Health check and follow-up per patient were an estimated £29.27.	*Field et al.1995 -cost (317)* *Langham et al. 1996 for cost effectiveness (337)*
Nutrition counselling in general practice - Australia - Adults with overweight, hypertension or diabetes, n=273 - 12 months - Aimed at improving diet of	**Not reported/not measured**	**Not reported/not measured**	**Effective** IG2 lost 6.7 kg at a cost of A$ 9.76 per kg and IG1 lost 5.6 kg at a cost of A$ 7.30 per kg. Higher weight loss was found in those	This study showed that general practitioners with a dietician could produce significant weight and blood pressure improvements with health promotion methods.	*Pritchard et al. 1999 (350)*

patients. ***Activities*** - IG1: Dietician provided counselling over 6 sessions -IG2: Dietician with doctor gave counselling over 6 sessions - CG.			who attended all sessions. Both groups also significantly improved blood pressure.		
Oxford fruit and vegetable study - Oxfordshire, United Kingdom - Healthy adults (IG=70, CG= 58) aged 25–64 years - 2 consultations, 6 months apart and follow-up - Aimed at increasing F&V intake to at least 5 portions a day - Based on brief negotiation model. ***Activities*** - Diet education by a trained research nurse.	**Not reported/not measured**	**Effective** The IG increased F&V intake by 1.4 portions per day at 6 months with no change in the CG.	**Not shown to be effective** No change in plasma flavonol concentrations.	Interviews were carried out by trained nurses. The outcomes need to be measured in the long-term.	*Huxley et al. 2004. (328)*
Obesity prevention programme for African American women and daughters - USA - Mother-daughter, low-income, assigned to IG or CG - 12 weeks, assessed at baseline and after 12 weeks	**Not reported/not measured**	**Moderately effective** After 12 weeks the IG mothers had significantly less % E from fat and saturated fat than CG. Significant improvement also for daughters in % E from fat.	**Not reported/not measured**	The intervention needs to be evaluated over a longer period.	*Stolley and Fitzgibbon 1997 (360)*

- Aimed at prevention of obesity by decreasing dietary fat, saturated fat and cholesterol intakes and increasing PA. - Culturally specific.					
Physician recommendations for dietary change - Washington State, USA - Adults (n=395) who had received physician's recommendations in the previous year reported their experiences - Aimed at determining the number and characteristics of patients who had received physician's recommendations for dietary change in the previous year, and whether this was associated with changed dietary habits.	**Promising/insufficient evidence** Patients who received advice were more likely to be in maintenance stage of dietary change.	**Promising/insufficient evidence** After adjustment for age and history of chronic NCD there were no significant differences in any measure of current dietary behaviour. However, those who received advice were more likely to report decreased use of high-fat foods and increased use of high-fibre foods.	**Not reported/not measured**	The use of a physician as a source of recommendation did not appear to change dietary intake significantly.	*Hunt et al. 1995 (326)*
Australian national heart foundation programme - Australia - Adults (n=146, IG=76, CG=70), aged 18–60 years with cholesterol between 5.5 and 7.9 mmol/l; and 23 general practitioners from 13 sites - Post-test at 4 months - Aimed at reducing	**Not shown to be effective** No significant differences were seen in attitude.	**Not shown to be effective** A high proportion of patients in both groups reported making changes to their diet, though no significant differences were noted between groups.	**Moderately effective** There was a significantly greater decrease in the cholesterol levels of the IG (13.5% of baseline level). A greater number of patients had moved below	The intervention took only 5 minutes of general practitioner time and could be integrated into routine care. The minimum control intervention had positive results in decreasing cholesterol and would be more cost- and time-efficient than the	*Redman et al 1995 (351)*

cholesterol levels. ***Activities*** - General practitioner diet advice based on the programme, brief feedback on cholesterol level and weight, pamphlets and follow-up cholesterol check at 4 months. - CG received minimal advice.			the 5.5 mmol/l cut-off point. No significant difference in BMI between groups.	extended intervention.	
Eating patterns study - Puget Sound, Seattle, USA - Adults (IG=1010, CG=1111) at 12 month follow-up from 29 physician practices - One-off intervention with a follow-up visit at 12 months - Aimed at increasing dietary fibre and decreasing fat intake - Booklet developed on basis of social learning theory. ***Activities*** - Physician provided self-help booklet and a brief endorsement/ motivational message on diet - A reminder letter sent by physician 2 weeks after intervention.	**Moderately effective** The intervention effect for fat and fibre score was greater for persons at the action or maintenance stage.	**Moderately effective** There was a significantly greater intervention effect for percentage fat and fibre scores in the IG versus the CG at 12 months. The intervention was most effective for the most physically active and least effective for high-risk behaviour individuals.	**Promising/insufficient evidence** Total cholesterol decreased, though not significantly different to CG. No change in BMI in either group.	This low-intensity intervention could be incorporated into routine delivery of health care. Process evaluation indicated that only about 50% of patients received the booklet from their physician, the remainder from other clinic staff. Overall, 93% reported reading at least part of the booklet.	*Beresford et al1997 (303)* *Lazovich et al.2000 for process evaluation (338)*

WATCH (Worcester Area Trial for Counseling in Hyperlipidemia) - Massachusetts, USA - Adults in upper 25th percentile cholesterol at first meeting (n=1162 at baseline and n=325 at exit interview) - 1 year (4 visits) and follow-up at 1 year - Aimed at decreasing the intake of fat, saturated fat and low-density lipoprotein cholesterol. ***Activities*** - Training of 45 primary care physicians - Physicians in IG2 and IG3 received a 3-hour training 1) Usual care 2) Physician diet counselling care 3) Physician diet counselling care and office care support.	**Not reported/not measured**	**Effective** IG3 reported a 10.3% decrease in saturated fat intake. IG3 physicians demonstrated significantly greater implementation of the diet counselling sequence. Significant reductions in saturated fat (22.0%) and total fat (8.2%) intake for patients attending at least 3 sessions.	**Effective** Significant decreases were seen in weight, triglycerides and total high-density lipoprotein cholesterol ratio in IG3. This group also showed significant reductions in low-density lipoprotein cholesterol and body weight.	Physicians spent an average of 28 minutes with patients in Group 3 which was 5.5 minutes longer than those in Group 1. Of this total time, an average 8.2 minutes were spent discussing diet. Overall, the study showed that brief physician diet counselling can produce beneficial effects in diet, weight and blood lipids. However, training of physicians alone was not sufficient to bring about significant changes.	*Ockene et al. 1996 (345)* *Herbert et al 1999 (321)*
Behavioural counselling on fruit and vegetable consumption - Inner city, United Kingdom - Low-income adults (IG=169, CG=351) - 2 weeks and post-test at 4 and 12 months - Aimed at increasing F&V and reducing fat intake	**Promising/insufficient evidence**	**Effective** There was a significant improvement in the IG for dietary fat intake, regular PA and smoking cessation at 4 and 12 months. The IG increased F&V by	**Minimally effective** No differences were found between groups for serum cholesterol, BMI and diastolic blood pressure. Systolic blood pressure	The consultations were given by nurses who were trained over 3 days by psychologists. This may be feasible in any primary health care centre where nurses work, except that it increases their workload. The	*Steptoe et al 1999 (357)* *Steptoe et al. 2001 for effects of behavioural counselling on stage of change (359)* *Steptoe et al. 2003 (358)*

(also other CVD risk factors) - Based on social learning theory and the stages of change model. ***Activities*** - Two to three 20-minute behavioural counselling consultations over 2 weeks by active nurses - CG received diet counselling - IG received behavioural counselling.		1.50 portions/day versus 0.87 in the CG ($P < 0.05$) at 12 months. The proportion eating 5 F&V per day increased by 42% in the IG. Significant decreases in smoking prevalence.	was reduced at 4 months but not at 12 months. There were no significant changes in body weight, BMI, blood pressure or serum cholesterol at 12 months. B-carotene and tocopherol increased in both groups but mostly in the IG.	behavioural intervention for fat reduction was particularly effective for patients in pre-contemplation and contemplation stages at baseline.	
NC WISEWOMAN (Well Integrated Screening and Evaluation for Women across the Nation) - North Carolina, USA - Women (IG=721, CG=742) from 14 health departments, aged over 50 years with low income, the majority of whom had at least 1 CVD risk factor - 6 months, revaluated at 6 and 12 months - Aimed at reducing CVD risk by reducing fat and cholesterol intake - Based on social cognitive theory, transtheoretical model and basic behaviour modification principles. ***Activities*** - Expanded established	**Not reported/not measured**	**Minimally effective** Diet score summarizing fat and cholesterol intake improved significantly by 2.1 points compared with no improvement in the CG.	**Not shown to be effective** Changes in total cholesterol, high-density lipoprotein, diastolic blood pressure and BMI seen in the IG but not significantly different to the CG.	The "New Leaf Programme" was adapted for use by a variety of health professionals with limited training in diet.	*Rosamond et al. 2000 (353)*

cancer screening programme - 3 counselling sessions on diet and PA using an assessment and counselling programme designed for low literacy and low-income patients. Also tailored and culturally appropriate - CG given usual care.					
EatSmart - Harvard, USA - Adult primary care patients, IG=195, n=28 primary care providers, CG=252, n=50 primary care providers) from 6 group practices - 3 months - 1 provider visit and telephone follow-up at 2 weeks and 2 months - Aimed at increasing F&V and decreasing fat intake - Based on stages of change theory. ***Activities*** (1) Personalized recommendations and stage matched educational booklets by mail, (2) Provider endorsement of recommendations (nurses or physicians), (3) 2 motivational interview	**Not reported/not measured**	**Minimally effective** The IG had 0.6 servings/day higher intake F&V than the CG. No changes in consumption of red meat or dairy products.	**Not reported/not measured**	Provider input does not require a lot of time because other support systems exist such as mailings and telephone calls. It may be difficult to implement in low- and middle-income countries for cost and expertise factors.	*Delichatsios et al. 2001 (241)* *Hunt et al. 2001for process evaluation (327)*

counselling sessions by telephone, (4) Consultation with nutritionist available if needed - Telephone counsellors were trained masters public health students - Booklets written by a dietician.					
Health lifestyle pattern – secondary data analysis of the *Eating patterns study* - See *Eating patterns study* - Participants were grouped into 6 lifestyle patterns according to diet, alcohol, PA and smoking status.	**Not reported/not measured**	**Effective** Clients in the fitness and good diet groups made the most significant changes in fat and fibre intake.	**Not reported/not measured**		*O'Halloran et al. 2001 (346)*
Health promotion for adolescents in primary care - Hertfordshire, United Kingdom - Teenagers aged 14–15 years (IG=322, CG=337) and 8 general practitioners - One-off intervention with post-tests at 3 and 12 months - Aimed at allowing teenagers to discuss the health topic of their choice - Based on stage of change model. ***Activities***	**Minimally effective** Positive movement in stages of change for diet and exercise was seen at 3, but not 12 months.	**Minimally effective** Positive changes in behaviours at 3 months but not significant.	**Not reported/not measured**	The large non-response at follow-up may have underestimated the real effects of the intervention, which was well received and relatively cheap. The consultation was given by the practice nurse, not the general practitioner. A more sustained intervention is needed to help maintain short-term gains.	*Walker et al. 2002 (363)*

- 20-minute consultation to discuss health behaviour of their choice (diet, exercise, smoking and alcohol) with trained nurses.					
Adults attending colorectal cancer screening - London, United Kingdom - Adults (IG=325, CG=316) aged 55–64 years recruited from 3 cancer screening clinics - Brief intervention with follow-up at 6 weeks - Aimed at increasing F&V intake - Based on stage of change model. ***Activities*** - 2-page computer information tailored to individual intake and knowledge levels (by post).	**Moderately effective** Knowledge of the 5-a-day message increased from 47% to 73%, and attitudes to fruit were more positive in the IG.	**Moderately effective** This could become good practice if evaluated over a longer period. A significant increase in daily servings of F&V: 1.06 versus 0.26 in the CG. The number of people eating 5 serves/day increased from 25% to 42% versus no change in the CG.	**Not reported/not measured**	Cancer screening clinics are an appropriate setting to provide advice on increasing F&V intake. Motivated subjects attending the clinic for screening volunteer to receive extra information on diet. Since this programme was evaluated at 6 weeks after diet information was posted, it is not possible to predict longer term results.	*Baker and Wardle 2002 (301)*
Women's health initiative dietary modification trial plus motivational interviewing - USA - 3 clinical centres - Post-menopausal women participating in the Women's health initiative dietary modification intervention (IG=82,	**Not reported/not measured**	**Effective** Between baseline and 1 year follow-up, % E from fat decreased by 1.2% in the IG while it increased by 1.4% in the CG.	**Not reported/not measured**	This may be difficult to implement outside a research setting, especially in low- and middle-income countries as trained dieticians make it labour-intensive.	*Bowen et al. 2002 (304)*

CG=82) - 5 months and post-test after 12 months - Aimed at testing an added intervention component based on motivational interviewing to decrease fat intake - Theory based on stages of change. ***Activities*** - 3 individual motivational interview contacts in person or by telephone from a dietician plus the usual Women's health initiative dietary intervention.					
Women's health initiative dietary modification trial - USA - Menopausal women (IG=5004, CG=7426), aged 50–79 years from 40 clinical centres - 8 years, results after 2 years - Aimed at decreasing fat and increasing F&V intake - Based on motivational interviewing theory. ***Activities*** - 18 group sessions in first year followed by group maintenance sessions once every 3 months by nutritionists	**Not reported/not measured** Adherent women were more likely to report assertiveness, a lifelong commitment to reduce dietary fat, satisfaction with lifestyle changes and having applicable knowledge and skills.	**Effective** IG reduced fat by 24.3 g/d compared with CG.	**Not reported/not measured**	Trained nutritionists run the sessions which make it costly. Racial and ethnic preferences were observed in food selections, which highlights the importance of designing culturally appropriate interventions.	*Patterson et al. 2003-2 year results (348)* *Kearney et al. 2002 for influences on adherence to WHIDM (334)* *Hopkins et al 2001for predictors of dietary maintenance (323)* *Langer et al.2003 (336) and Ritenbaugh et al. 2003 for baseline findings (352)* *Anderson et al 2003 for implementation (300)*

- Additional sessions with dietician when non-compliant with goals.					
Women's health initiative dietary modification trial - USA - Menopausal women (IG=19 541, CG=29 294), aged 50–79 years from 40 clinical centres - Aimed at reducing diet to a low-fat (< 20%), high-fibre, high F&V pattern - Based on stages of change the ***Activities*** - 18 group sessions in year 1 followed by quarterly and annual maintenance sessions - Self-monitoring of dietary intake.	**Not reported/not measured**	**Effective** Differences between IG and CG at 1 and 5 years respectively: % E fat 10.9 and 9.0.	**Not reported/not measured**	The intervention used a special populations advisory committee to make intervention materials culturally appropriate. This comprehensive and extensive study required large capital and human resources, which may make it difficult to implement in low- and middle-income countries.	*Patterson et al.2003 (348)* *Patterson et al. 2004 (347)*
Women's health initiative dietary modification trial - USA - Menopausal women (IG=19 541, CG=29 294), aged 50–79 years from 40 clinical centres - Aimed at reducing diet to a low-fat (< 20%), high-fibre, high F&V pattern - Based on stages of change theory. ***Activities***	**Not reported/not measured**	**Effective** Dietary fat intake was significantly lower in the IG (8.1% at year 8). F&V consumption was significantly higher in the IG (by at least 1 serving per day).	**Not shown to be effective** There were no significant differences in breast cancer, colorectal cancer or CVD after 8 years. However, there was a significant difference in weight between	The authors recommend a more focused diet and lifestyle plan.	*Beresford et al. 2006 (colorectal cancer) (305)* *Prentice et al. 2006 (breast cancer) (349)* *Howard et al.2006 (CVD) (325)* *Howard et al. 2006 (weight) (324)*

- 18 group sessions in year 1 followed by quarterly and annual maintenance sessions - Self-monitoring of dietary intake.			the groups.		
NC WISEWOMAN (Well Integrated Screening and Evaluation for Women Across the Nation) - North Carolina, USA - Low-income, midlife women from 22 health departments (IG=302,CG=209) enrolled in WISEWOMAN programme - 1 year maintenance intervention and follow-up - Based on stages of change theory. ***Activities*** - After a 6-month behavioural change programme, IG were mailed 6 sets of computer-tailored health messages and received 2 computer-tailored telephone counselling sessions.	**Minimally effective** The IG was more likely to move into a more advanced stage of change for PA.	**Minimally effective** Both groups maintained low levels of reported saturated fat and cholesterol at follow-up.	**Not shown to be effective**		*Jacobs et al. 2004 (329)*
Healthy directions – Health centres study - USA - 10 health centres and 97 clinicians (IG=959,	**Not reported/not measured**	**Moderately effective** Significant differences existed between IG and CG	**Not reported/not measured**	The programme was designed to take into account elements of the social context that are critical components of	*Emmons, KM. 2005. (314,315)* *Lobb et al 2004 for process evaluation (339)*

CG=979), low-income, multi-ethnic adults, primarily women and older participants - Follow-up at 8 months - Aimed at reducing cancer risk by increasing F&V intake, PA and use of multivitamins, and reducing red meat intake - Counselling session based on motivational interviewing with a health adviser, and ecological approach. ***Activities*** - Brief study endorsement from a clinician - 4 follow-up telephone counselling sessions with health adviser - 6 sets of tailored materials - Links to relevant local activities.		for servings of F&V per day, servings of red meat per week and multivitamin intake. No difference in PA.		an ecological approach to health behavioural change. It was developed with input from a community advisory board. Costs were US$ 168 per patient. Staff time made up 67% of these costs. The intervention seems feasible in relatively large practices with substantial integration and structure, and less appropriate for small groups with less extensive resources.	
PREVENT - Massachusetts and North Carolina, USA - Adults aged 40–75 years with adenomatous colon polyps (IG=597, CG=493) - Two-and-a-half years with follow-up at 8 months - Aimed at reducing multiple behavioural risk factors for colon cancer (increased F&V, low	**Not reported/not measured**	**Moderately effective** One third of the CG dropped a risk factor compared with almost half of the IG. The IG was also more likely to change more than one behaviour than CG. No significant difference between	**Not reported/not measured**	This programme showed that comprehensive interventions that move beyond emphasis on a single risk factor are acceptable to patient populations. They can result in improvements and seem cost-effective because they are delivered by mail and	*Emmons et al. 2005. (314,315)*

alcohol, decreased red meat, multivitamins, PA and smoking cessation) - Based on social cognitive theory. ***Activities*** - Initial motivational goal-setting telephone call by health educator - 4 follow-up telephone calls at monthly intervals - Computer-generated progress reports - Tailored self-help materials - Intervention delivered by trained health advisors.		IG and CG for dropping the risk factor through F&V intake. Significantly greater increases in multivitamin intake and decreases in servings of red meat in the IG.		telephone without the need for personal contact.	
Rural physician cancer prevention project - Virginia, USA - Low socioeconomic, low education/literacy rural adults (CG=278, IG=238 from 3 physician practices) - 1 month, follow-up at 12 months - Aimed at reducing fat and increasing fibre intake - Based on social marketing model and social cognitive theory. ***Activities*** - Mailed personalized feedback and physician letter - At 2 weeks a brief	**Minimally effective** No significant differences were seen between groups in fat knowledge or self-efficacy scores. Increased intention to change for fat and fibre intake in the IG.	**Moderately effective** Improvement noted in dietary fat and fibre behaviour at 1, 6 and 12 months ($P < 0.05$).	**Not reported/not measured**	The project provides a reasonably effective model to achieve dietary health behaviour change in a rural, minority and low literacy/education population. Low-intensity programme but requiring significant workforce, effort which may be hard to implement in disadvantaged communities.	*Fries et al. 2005 (318)* *Fries et al. 2005 for commentary overview (319)*

counselling telephone call - Series of personalized self-help booklets mailed weekly - Materials developed with the aid of a community advisory board.					
Family based health education/counseling - Kainuu, Finland - Children aged 6–17 years (IG=432, CG1=200 high-risk and CG2=423 low-risk) with a family history of CVD. Other family members also participated - 3 years and follow-up - Aimed at modifying, or changing unfavourable health behaviours and reducing risk of CVD - Based on health education approach. ***Activities*** - 5 counselling sessions: 2 for children at school and 3 for children and family at home - Also given reading materials - Counselling by public health nurses.	**Not reported/not measured**	**Promising/insufficient evidence** Changes in use of fats, salt and PA were more favourable in the IG. Less favourable effects on the use of high-fibre foods.	**Not reported/not measured**	The intervention was implemented in cooperation with a volunteer health agency and a primary health care organization. Using trained nurses may be labour-intensive and difficult to implement in low- and middle-income countries.	*Salminen et al. 2005 (355)*

Community-based multiple risk factor intervention in African-American families - Baltimore, USA - Siblings aged < 60 years of African-American probands identified in 10 hospitals with a coronary heart disease event (IG=196, CG=168) - 1 year, follow-up at 1 year - Aimed at reducing coronary heart disease risk in high-risk African-American families. ***Activities*** - CG: Primary care group received enhanced traditional primary care - IG: Community-based care designed by community members to enhance usual care and avoid barriers: accessible community-based care site, gym facilities, counselling on diet, PA and smoking by nurse practitioner, pharmacy service, and availability of community health worker.	**Not reported/not measured**	**Moderately effective** A significant improvement was noted in the IG for PA, smoking and % E from sweets (not from fat). Also improved percentage taking antihypertensive and lipid-lowering drugs.	**Moderately effective** A significant improvement in the IG for low-density lipoprotein cholesterol, blood pressure and glucose. No improvement in high-density lipoprotein cholesterol or BMI.	The IG demonstrated a significant overall reduction in global coronary heart disease risk, whereas no reduction was seen in the CG. The IG was twice as likely to achieve goal levels of low-density lipoprotein cholesterol and blood pressure compared with the CG. The average number of illness-related visits over 1 year to the primary care provider was 4.4 and 4.5 in the IG and CG respectively. A third of all IG encounters was by telephone.	*Becker et al. 2005 (302)*

Effect of nutritional counseling in general practice - Torino and Asti, Italy - Adults aged 18–65 years (IG=1488, CG=1489) - 1 session of 15 minutes and follow-up at 6 and 12 months - Aimed at attaining an intake of more than 5 serves/day of F&V. ***Activities*** - Educational intervention by general practitioner and a brochure on the basics of a healthy diet.	**Not reported/not measured**	**Moderately effective** Significant improvements in F&V, servings of fish, meat and olive oil were noted after 1 year.	**Minimally effective** BMI decreased significantly by –0.41 in IG, but not in CG.	This was a brief intervention of 15 minutes combined with a brochure.	*Sacerdote et al. 2006 (354)*

Primary health care (physical activity)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	Behavioural changes	Physical and clinical changes		
Green Prescription - New Zealand - 12 months. ***Activities*** - Brief counselling session with general practitioner including exercise prescription (green prescription) - Copy of green prescription faxed to local sports foundation which sent out quarterly newsletters on PA initiatives in the	**Moderately effective** Quality of life in adults and older adults improved.	**Effective** Energy expenditure and minutes per week of PA increased.	**Promising/insufficient evidence** May reduce blood pressure.	This intervention is rolled out nationally in New Zealand and has been running since 1995.	*Elley et al 2003 (312)* *Kerse et al 2005 (335)* *Elley et al 2004* (313)* *Swinburn et al 1998 (361)* *www.sparc.org.nz (364)*

community - At least 3 telephone calls from exercise specialist.					
PACE (Physician-based Assessment and Counseling for Exercise) - Canada and USA - n=255 study participants - 4–6 weeks with follow-up. ***Activities*** - Motivational statement congratulating participation - Reading materials, workbook with self-help booklet on goal-setting and barriers - 3 telephone calls per month from exercise/health specialist.	**Promising/insufficient evidence** Transtheoretical model stage of change increased. However, some studies showed no improvements. Evidence is not conclusive in all studies.	**Moderately effective** Walking and weekly amount of PA increased.	**Promising/insufficient evidence** Evidence across studies was contradictory.	This programme seems most effective in countries where health care is provided by the State (e.g. Canada). There is widespread research but results are not consistent. The programme is also diversifying to different populations including adolescents and those with type 2 diabetes.	*Green et al. 2002 (20)* *Marcus et al. 1997 (341)* *van Sluijs et al 2004 [Netherlands] (362)* *Calfas et al 1996 (307)* *Long et al 1996 340* *www.paceproject.org (366)*
ACT (Activity Counseling Trial) - USA - 874 participants - Follow-up at 24 months ***Activities*** - Counselling by general practitioner	**Not reported/not measured**	**Promising/insufficient evidence** Small or no increase in weekly PA was noted.	**Moderately effective** Improved VO2 max and small amounts of weight loss.	Costs per person seem detrimental to widespread implementation. Further research is needed on behavioural changes engendered by the programme.	*Albright et al 2000 299* *Aittasalo et al. 2006 298* *Neumark et al 1995 (344)*

- Meeting with health educator who provided information on the national PA recommendations - Motivational video, interactive monthly mail with pedometer and ongoing feedback.				
WISEWOMAN (Well-Integrated Screening and Evaluation for Women Across the Nation) - Targeted uninsured females from ethnic groups, with multiple chronic NCD risk factors - 12 months. ***Activities*** - Health education with community worker support and counselling.	**Not reported/not measured**	**Moderately effective** Weekly moderate to vigorous PA increased.	**Moderately effective** Systolic blood pressure and total cholesterol decreased.	*Staten et al. 2004 (356)* *Jilcott et al. 2004 (330)*
POWER (Pounds Off with Empowerment) - Diabetic patients - Women in a medically underserved rural community - 12 months. ***Activities*** - Group lectures on curriculum	**Not reported/not measured**	**Moderately effective**	**Moderately effective** Decreased fasting blood glucose noted, along with weight loss and a decrease in BMI.	*Mayer-Davis et al. 2004 (343)* *Mayer-Davis et al 2001 (342)*

- Nutritionist delivered PA and nutritional components - Self-monitoring of diet and PA.					
Health checks - United Kingdom - 7123 participants - Follow-up at 24 months. ***Activities*** - Annual health checks with general practitioner plus brief PA counselling.	**Not reported/not measured**	**Promising/insufficient evidence**	**Insufficient evidence/not likely to be effective**	The effectiveness of health checks in changing PA behaviour and awareness may be increased by better training and resources for the general practitioner on PA.	*Dowell et al. 1996 (310)* *Ettner et al. 1999 (316)*
Minimal intervention - United Kingdom - 1658 participants - Follow-up at 12 months. ***Activities*** - Single, brief counselling session - General information given.	**Not shown to be effective**	**Not shown to be effective**	**Not shown to be effective**	Interventions may need to be more comprehensive to be effective.	*Hillsdon et al. 2002 (322)*

Older adults (diet)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
Seattle senior farmers' market nutrition pilot programme - Seattle, USA - Low-income seniors interviewed at 6 months (IG=87, CG=44) - Aimed at increasing F&V intake. ***Activities*** - Market baskets were delivered to the homes of seniors every 2 weeks by *Meals on Wheels* drivers.	**Not reported/not measured**	**Effective** A significant increase of 1.04 servings of F&V per participant/ day was noted. The percentage of the elderly eating 5 or more F&V servings a day increased from 22% to 39%.	**Not reported/not measured**	This system could work well in other areas that have an established *Meals on Wheels* (or similar) infrastructure. Home delivered baskets brought participants joy, stimulated interest in healthy foods and improved quality of life.	*Johnson et al.1994 (370) Smith et al. 2004 for qualitative assessment 17-(381)*

Older adults (physical activity)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
CHAMPS II (Community Healthy Activities Model Programme for Seniors) - Members of health maintenance organizations in USA - n=164 persons - 12 months - Aimed to have participants active at least 30 minutes per day on most days of week. ***Activities*** - Trained staff assisted participants to develop and maintain tailored PA programme - Participants were encouraged to participate in PA that addressed more than 1 component of fitness and function - Participants could choose group (community-based) or individual exercise sessions.	**Insufficient evidence/ promising**	**Effective** Both moderate intensity and total weekly PA increased. Equivalent to five 1-mile walks per week.	**Moderately effective** BMI decreased.	The programme was particularly effective for those who were older, sedentary and overweight, and particularly for women. This study was conducted in a high-quality health-care setting but did not include minority groups.	*Stewart et al. 2001 (382)*
CHIPs (Community Health Intervention Programmes) - South Africa - Under-resourced community - n=98 community dwellings	**Not reported/not measured**	**Minimally effective** There was an increase in exercise-related energy expenditure, but no increase in total weekly energy	**Moderately effective** Balance, strength, lower body muscle strength and systolic blood pressure all increased.	Even if only twice weekly, seated PA resulted in improved measures of functional performance and fitness in seniors. The	*Kolbe-Alexander et al. 2006 (371)*

- 20 weeks. ***Activities*** - Low-intensity seated PA twice a week - Peer led - Exercise sessions consisted of cardiovascular, resistance and flexibility training.		expenditure.		programme was community-based, and community members were trained as PA leaders. This programme has demonstrated sustainability for 8 years.	
Strong for life - Massachusetts, USA - n=102 community dwellings - 15 weeks. ***Activities*** - 30-minute video programme comprising 10 exercises - Included resistance training - 5-minute warm up, 20-minute strength training, 5-minute cool down - Participants had to aim for 3 exercise sessions per week - Periodic telephone calls from trained therapist.	**Not reported/not measured**	**Minimally effective** 58% participated in PA twice a week. Social functioning scores improved for men and women.	**Moderately effective** Leg muscle strength increased (10%) for those aged $\leq$ 72 years.	A video-based PA programme may be an effective method to encourage seniors to exercise. However, the exercises might need to be gender specific and target the 'younger' versus 'older' seniors.	*Jette et al. 1996 (369)*
Active for life - 4 community-based organizations implemented either Active Choices (telephone-based intervention over 6 months) or Active Living Every Day	**Moderately effective** Depressive symptoms and stress decreased and body satisfaction and appearance increased.	**Moderately effective** Significant increase noted in moderate to vigorous activity in both IGs.	**Moderately effective** Both IGs had a decrease in BMI.	These programmes demonstrate successful translation of evidence-based PA programmes in a community of older adults with diverse backgrounds.	*Wilcox et al., 2006 (383)*

(20-week group-based programme). ***Activities*** - Focus on necessary behavioural skills to become more physically active.					
Health enhancement programme - Washington, USA - n=304 community dwellings - 12 months. ***Activities*** - Health and functional assessment by nurse - Followed by personalized health and action plan - Participants encouraged to enrol in lifetime fitness programme, chronic NCD self-management course, and a meeting with social worker.	**Promising/insufficient evidence** 85% of participants were able to improve lifestyle to make sustained health changes.	**Moderately effective** The number of inactive participants decreased from 56% to 38%.	**Promising/insufficient evidence** Health status in IG either improved or remained constant compared to a decrease in CG.	This multi-faceted health promotion programme for seniors resulted in increased PA levels. Individual counselling at baseline may positively influence expected outcomes.	*Phelan et al. 2002 (378)*
Sheffield community based exercise programme - Sheffield, United Kingdom - n=6420, community dwelling patients from 12 general practitioner practices - 2 years. ***Activities*** - Free supervised PA sessions twice a week	**Promising/insufficient evidence** No change was noted in the use of health-care services between groups.	**Minimally effective** 26% of participants attended 1 or more sessions over the 2-year period (2040 sessions provided).	**Insufficient evidence**	Participants were recruited from private medical practices, a good opportunity to prescribe exercise to inactive older adults. Economic evaluation of the programme showed it was cost-effective and produced small health benefits. More advocacy may be	*Munro et al. 2004 (375)*

- PA sessions of 45 minutes, including cardiovascular, resistance flexibility and coordination training.				needed to increase engagement and uptake of this community-based exercise opportunity for senior adults.	
Greek minimum PA frequency - Greece - n=55 community dwellings - 10 weeks. ***Activities*** - Groups participated in exercise either 1, 2, or 3 times a week - Sessions of 45 minutes.	**Not reported/not measured**	**Promising/insufficient evidence** The drop-out rate was low, especially for the once a week group.	**Moderately effective** Dynamic balance, flexibility and endurance and coordination improved.	Improvements occurred even in those exercising only once per week, but greater improvements were noted in those exercising 2 or 3 times per week.	*Ourania et al. 2003 (377)*
Community-based strength/ resistance training for older adults - USA - n=37, community dwelling men and women aged 70 ± 4 years - 6 weeks resistance training. ***Activities*** - Three 45-minute sessions per week - Intensity increased with improved strength during the intervention - Before each session, 20 minutes stretching.	**Not reported/not measured**	**Not reported/not measured**	**Moderately effective** Improvements noted in upper and lower body strength (arm curls and chair stand tests), and flexibility (upper back scratch and chair sit-and-reach), and agility (8 foot up and go). No improvement in 6-minute walk test.	After only 6 weeks of strength training, results showed significant improvement in functional ability in older adults. Improvement in functional fitness plays a role in maintaining independence and delaying frailty.	*Cavani et al., 2002, (308)*
Home-based strength and balance training for older adults	**Not reported/not measured**	**Moderately effective** 82% of those in the IG exercised 3 times per	**Moderately effective** Functional performance and	The compliance in this study was high (82%) suggesting that home-	*Nelson et al., 2004, (376)*

- Boston, Massachusetts, USA - n=72 community dwelling men and women aged 77 ± 5.3 years. ***Activities*** - 6 months home-based strength and balance training - Booklet describing the exercises, sets of dumbbells and ankle weights - 3 sessions per week.		week for 6 months.	balance improved. No difference in 6-minute walk test.	based exercise interventions may be effective in increasing levels of PA and associated benefits in older adults. The older adults received 6 visits during the first month, and 1 per month thereafter. Participants also submitted logbooks monthly which could have facilitated compliance.	
Community-based strength/ resistance training for older adults - n=39 community dwelling men and women - Aged 72.5 ± 6.3 years - 16 weeks. ***Activities*** - IG1: Strength training - IG2: Power training: week 1–8 same as IG1, week 9–16 performing exercises as fast as possible.	**Not reported/not measured**	**Insufficient evidence** 78% of participants completed the study.	**Promising/insufficient evidence** IG1 and IG2 improved physical functioning (balance and coordination, endurance and upper body flexibility). No significant difference in maximal muscle strength and anaerobic power between IG1 and IG2.	IG2's absolute workload was lower than the IG1, but the improvements were greater for physical function. This suggests that more power training may need to be included in PA programmes for seniors.	*Miszko et al., 2003 (374)*
Strength training - Maryland, USA - n=23 community dwelling men and women, aged 65–73 years. - 6 months. ***Activities*** - Months 1–3: 1 x 15	**Not reported/not measured**	**Insufficient evidence**	**Promising/insufficient evidence** Upper and lower body strength increased significantly, with men showing greater improvement. Systolic and diastolic blood	Strength training on its own can play a role in reducing blood pressure in addition to improving muscle strength. Greater improvements were noted among men,	*Martel et al.1999 (373)*

repetitions for lower upper and 2 x 15 repetitions for upper body exercises using resistance training machines - After 3 months: warm up followed by exercises until unable to complete a set of 15 repetitions - Intensity: near maximal effort for each repetition and resistance increased progressively over 6 months.			pressure decreased significantly. No significant changes in BMI.	although the small size of this study may affect generalizations.	
Korean outdoor walking track - Republic of Korea - n=27 community dwelling women - 8 weeks. ***Activities*** - Outdoor walking track - 50 minutes building up to 3 hours, 3 times per week - 5-minute warm up, 30–40 minutes walking, 10 minutes stretching and 5 minutes cool down.	**Not reported/not measured**	**Promising/insufficient evidence**	**Moderately effective** Blood pressure, flexibility and VO2 max improved.	PA is not culturally popular among older women of the Republic of Korea, and walking may be a means of encouraging PA in this group.	*Shin et al. 1999 (380)*
Tai Chi Chih - California, USA - n=46 community dwellings - 10 weeks. ***Activities*** - 20 simple non-strenuous movements	**Not reported/not measured**	**Promising/insufficient evidence** 62% of participants attended at least 6 group-based sessions and practiced at least 3 times per week at	**Minimally effective** Balance for 'eyes open' test significantly improved, but not the 'eyes closed' test.	The results of this study may be less easy to generalize since participants were well-educated, of high socioeconomic status, physically active and	*Schaller 1996 (379)*

- One 60-minute group sessions per week - 3 practice sessions per week at home.		home.	healthy.	
Seniors Active Living in Vulnerable Elders (ALIVE) programme - Alberta, Canada - 10 months. ***Activities*** - Delivered in seniors' apartment buildings - Included exercise classes, health information sessions and newsletters - Qualitative evaluation.	**Promising/insufficient evidence** Qualitative changes in "feeling better", fun, social support, and perceived "comfort in the programme" were noted.	**Not reported/not measured**	**Not reported/not measured**	*Buijs 2003 (306)*
Health promotion programme for low-income elderly (Tai-Pai) - Tai Pai, Taiwan, China - 89 purposely selected low-income elderly. ***Activities*** - Health promotion programme for low-income elderly provided by trained low-income home health aides.	**Promising/insufficient evidence** No change was seen in psychosocial status, decreased perceived need for health promotion services.	**Not reported/not measured**	**Promising/insufficient evidence** Improved nutritional status and independent activities of daily living were both noted.	*Li 2004 (372)*

Religious settings (diet)

Intervention components	Outcomes			Policy/ process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
North Carolina black churches united for better health project - 10 rural counties in North Carolina, USA - 50 African-American churches (n=2519 adults, IG=1198, CG=1321) - 20 months and follow-up at 2 years - Aimed at increasing F&V consumption - Based on concepts from stages of change transtheoretical model, social cognitive theory and social support theory. ***Activities*** - Personalized tailored bulletins - Printed materials - Educational sessions - Gardening - Cookbook and recipe tasting - Serving F&V at	**Effective** The IG had a higher proportion of action or maintenance stage. Self-efficacy increased for eating 5 daily servings of F&V and knowledge that 5 a day are needed for good health (from 10% to 36%). Individuals in the action or maintenance stages consumed an average 6.5 daily F&V servings compared to 3.3– 3.5 for those in the earlier stages.	**Effective** The IG consumed 0.85 servings of F&V more than the CG. Increased fruit accounted for most of the improvement (0.66 serves/day). The difference in F&V consumption was significant for all demographics except those aged 18–37 years and those single.	**Not reported/not measured**	Strengths of the intervention were that it targeted multiple levels of change, and was culturally sensitive in its design of programmes and messages. Partnering of churches resulted in potential for maintenance and institutionalization of the 5-a-day programme within the church. There was a dose response relationship between intervention exposure and behavioural change. A nutrition action team of church members organized and implemented many of the activities. Lay health advisors from the church were also used. The relationship between stages of change,	*Campbell et al. 1999 for intervention outcomes (384)* *Campbell et al 1998 for stages of change (387)* *Campbell et al. 2000 for intervention and process evaluation (386)*

functions - Lay health advisors - Community coalitions - Pastor support.				self-efficacy, social support and barriers, supports the use of a multi-component intervention strategy.	
Project Joy - Baltimore, USA - 16 African-American churches and women aged 40+ years (n=529, IG=495, CG=74) - 1 year and post-test - Aimed at reducing cardiovascular risk behaviours and outcomes - Based on spiritual strategies. ***Activities*** - 3 strategies taught by professional health educators: (1) Standard intervention – group diet education and PA sessions, (2) Standard intervention with spiritual strategies, (3) Self-help strategies using materials from the Heart Association targeted to	**Not reported/not measured**	**Effective** Energy, fat and sodium intake improved. The number of people consuming 5 or more F&V/day, less than 40 g fat/day and the percentage consuming more than 25 g fibre/day all increased.	**Effective** Body weight, waist circumference, BMI and systolic blood pressure all improved.	Group sessions were taught by health educators assisted by lay educators for first 20 weeks, after which only lay educators taught the sessions for the rest of the year. Community involvement in the design of the intervention assisted community ownership and dissemination of the results. The number of sessions attended was strongly related to beneficial outcomes. Weekly attendance decreased after the professional health educators stopped leading the sessions, as participants felt peers were not qualified to lead IGs. There was good ownership of the	*Yanek et al 2001(396)*

participants' screening results.				project with 8 out of 9 active intervention churches still holding weekly sessions led by lay leaders. There is potential for considerable public health impact.	
Eat for life trial - USA - 14 African-American churches (IG=10, CG=4, n=861adults) - 1 year and post-test - Aimed at increasing F&V intake. ***Activities*** - Multi-component intervention with 3 treatment conditions: - CG: standard diet education materials - IG1: self-help group with 1 telephone cue call (to use intervention materials) - IG2: self-help group with 1 cue call and 3 counselling calls based on motivational interviewing	**Not reported/not measured**	**Effective** There was a significant increased intake of F&V in IG2 using motivational interviewing. Net difference versus CG was 1.03–1.38 serves/day. Net difference between IG1 and IG2 was 0.97–1.14 serves/day.	**Not reported/not measured**	This was a culturally sensitive intervention. Motivational interviewing appears a promising strategy for modifying dietary behaviour. The counsellors were dieticians. The lack of effects in IG1 versus CG can be attributed in part to lower use of self-help materials than in IG2. This intervention also made use of a local advisory board.	*Resnicow et al 2001 (392)*

- Intervention consisted of a video, cookbook, printed education materials, quarterly newsletter and cues such as fridge magnets.					
Body and soul intervention - USA - 15 African-American churches (IG=8, CG=8, n=854 adults) - 6 months and post-test - Aimed at increasing F&V intake - Based on *Black churches for better health* and *Eat for life trial*. ***Activities*** - Church-wide diet activities presented by trained lay workers - Self-help materials including cookbook, video and pamphlets - Motivational interviewing.	**Effective** Significant improvement noted in motivation, self-efficacy and social support to eat more F&V.	**Effective** F&V intake increased significantly from 0.7 to 1.4 servings/day.	**Not reported/not measured**	The intervention was delivered collaboratively by community volunteers and a health-related volunteer agency under real world conditions. Potential for large-scale diffusion. Volunteer liaison people were trained in programme implementation, and lay church members in motivational interviewing. The training was conducted by experienced professionals. The intervention would be more cost-effective for large-scale dissemination with a 'train the trainer' component.	*Resnicow et al 2004 (390)*

WATCH (Wellness for African Americans Through Churches) - North Carolina, USA - 12 rural African-American churches (n=587 adults) - Aimed at promoting colorectal cancer preventive behaviours - Based on social cognitive theory, stages of change transtheoretical framework, health belief model and social support models. ***Activities*** - IG1: 4 computer-tailored newsletters and targeted videotapes - IG2: lay health advisor - Analysis of effect of IG1 and IG2 independently and together as a multi-component programme versus a CG.	**Not reported/not measured**	**Moderately effective** IG1 increased F&V consumption by a 0.6 serving. Combined IGs increased intake by 0.3 servings/day. IG2 showed no significant increase. No differences between groups for fat intake. Improved recreational PA in IG1.	**Not reported/not measured**	The trained lay health advisor intervention did not prove effective, possibly due to suboptimal reach and diffusion. The computer-tailored newsletters and targeted videotapes intervention was effective for diet and PA behaviours.	*Campbell et al 2004 (385)*

Healthy body healthy spirit trial - Atlanta, USA - 16 African-American churches (n=906 adults, IG1=335, IG2=304, CG=267) - 1 year and post-test - Aimed at increasing F&V intake and PA - Based on the *Eat for life trial*. ***Activities*** - 3 conditions: - CG: standard diet and PA education materials - IG1: culturally targeted self-help diet and PA materials - IG2: same as IG1 plus 4 telephone counselling calls based on motivational interviewing - Intervention materials: diet video, cookbook, exercise video and guide.	**Not reported/not measured**	**Effective** Servings of F&V increased significantly (1.13 in IG2 and 0.44 in IG1) compared to CG but not for PA.	**Not reported/not measured**	The motivational interviewing intervention was delivered by psychologists which makes the programme expensive. The addition of the motivational interviewing component appeared to have a greater effect on F&V intake than on PA.	*Resnicow et al 2005 (391)*

Pilot church intervention to prevent obesity in African-American adults - Baton Rouge, Louisiana, USA - 6-month pilot study in 1 church - African-Americans. ***Activities*** - Randomized control trial with trained church leaders providing obesity intervention.	**Promising/insufficient evidence** Retention was 90%. Quality of life was improved in IG.	**Promising/insufficient evidence** Increased reported levels of activity in IG.	**Promising/insufficient evidence** Greater weight and fat losses noted in IG, but not statistically significant.	*Kennedy 2005 (389)*
Church-based diabetes control programme in Pacific Islanders - Pacific Islands - 2 years - Aimed at diabetes risk reduction - Non-randomized control trial. - Community development programme using lifestyle awareness.	**Insufficient evidence/ promising** Increased awareness, knowledge and readiness to change seen in IG churches.	**Promising/insufficient evidence** Self-reported exercise increased in 1 church.	**Not reported/not measured**	*Simmons et al., 2004 (394)*

Religious settings (physical activity)

Intervention components	Outcomes			Policy/process implications	*References*
	Psychosocial changes	**Behavioural changes**	**Physical and clinical changes**		
Faith on the move - USA - n=59. ***Activities*** **-** 12 weeks with both PA and diet - Culturally tailored - Faith-based component. **African Methodist Epsicopal (AME) churches: faith based PA intervention** - South Carolina, USA - Cohort of 20 randomly selected churches, n=571 members - Volunteer leaders trained (n=889) or wait-listed (1 year). ***Activities*** - Volunteer led, culturally tailored programme to increase PA levels in members of the AME church. **Healthy**	**Promising/insufficient evidence** In the *AME study* in South Carolina, programme awareness was high (> 67%), and this was linked to PA behaviour.	**Promising/insufficient evidence** Energy expenditure increased in *Faith on the mov*e participants.	**Promising/insufficient evidence** Short-term weight loss seen in *Faith on the Move* participants.	The church and similar culturally or socially relevant communities provide a potentially useful channel for implementing lifestyle interventions. In the case of the churches, health – and encouraging members to take personal responsibility for health – may in fact form part of the pastoral role of the church and church lay leaders. These programmes also use existing infrastructure, and often have a ready source of volunteer leaders, which enhances sustainability. There is as yet limited effectiveness data on longer term behavioural or clinical outcomes.	*Fitzgibbon et al 2005 (90)* *Wilcox et al. 2007 (395)*

body/healthy spirit
- Atlanta, USA
- 16 African-American churches
- Evaluation in progress with cluster-randomized design involving 5–6 churches in 3 groups: (1) CG, (2) culturally relevant programme, and (3) culturally relevant programme with motivational interviewing.

Activities
- Multi-component package that includes culturally tailored diet and PA materials
- Included a video addressing F&V intake, a video addressing PA, a gospel-based audio walking tape, a cookbook and a PA guide
- Materials incorporate spiritual/religious messages and biblical scripture.

REFERENCES

1. Resolution WHA57.17. Global Strategy on Diet, Physical Activity and Health. In: *Fifty-seventh World Health Assembly, Geneva, 17–22 May 2004. Resolutions and decisions, annexes.* Geneva, World Health Organization, 2004.
2. *Preventing chronic diseases: a vital investment*. Geneva, World Health Organization, 2005.
3. *Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation*. Geneva, World Health Organization, 2003 (WHO Technical Report Series, No. 916).
4. Andersen RE et al. Can inexpensive signs encourage the use of stairs? Results from a community intervention. *Annals of Internal Medicine*,1998,129(5):363–369.
5. Brownson RC et al. A community-based approach to promoting walking in rural areas. *American Journal of Preventive Medicine*, 2004, 27(1):28–34. 343
6. Brownson RC et al. Promoting physical activity in rural communities: walking trail access, use, and effects. *American Journal of Preventive Medicine*, 2000, 18(3):235–241.
7. Buscher LA, Martin KA, Crocker S. Point-of-purchase messages framed in terms of cost, convenience, taste, and energy improve healthful snack selection in a college foodservice setting. *Journal of the American Dietetic Association*, 2001, 101(8):909–913.
8. Coleman, KJ, Gonzalez EC. Promoting stair use in a US-Mexico border community. *American Journal of Public Health*, 2001, 91(12):2007–2009.
9. Curran S et al. Process evaluation of a store-based environmental obesity intervention on two American Indian Reservations. *Health Education Research*, 2005, 20(6):719–729.
10. Dowse GK et al. Changes in population concentrations and other cardiovascular risk factors after five years of the non-communicable disease intervention programme in Mauritius. *British Medical Journal*, 1995, 311:1255–1259.
11. Dunt D, Day N, Pirkis J. Evaluation of a community-based health promotion program supporting public policy initiatives for a healthy diet. *Health Promotion International*, 1999, 14(4):317–327.
12. Faskunger J et al. Effect of an environmental barrier to physical activity on commuter stair use. *Scandinavian Journal of Nutrition/Näringsforskning*, 2003, 47(1):26–28.
13. French SA et al. A pricing strategy to promote low fat snack choices through vending machines. *American Journal of Public Health*, 1997, 87:849–851.
14. French SA et al. Pricing and promotion effects on low fat vending snack purchases: the CHIPS Study. *American Journal of Public Health*, 2001, 91:112–117.
15. Gomez LF, Mateus JC, Cabrera G. Leisure-time physical activity among women in a neighbourhood in Bogota, Colombia: prevalence and socio-demographic correlates. *Cadernos de Saúde Pública*, 2004, 20(4):1103–1109.
16. Horgen KB, Brownell KD. Comparison of price change and health message interventions in promoting healthy food choices. *Health Psychology*, 2002, 21(5):505–512.
17. Kristal AR et al. Evaluation of a supermarket intervention to increase consumption of fruits and vegetables. *American Journal of Health Promotion*, 1997, 11(6):422–425.
18. Marshall AL et al. Can motivational signs prompt increases in incidental physical activity in an Australian health-care facility? *Health Education Research*, 2002, 17(6):743–749.
19. Oja P, Vuori I, Paronen O. Daily walking and cycling to work: their utility as health-enhancing physical activity. *Patient Education and Counseling*, 1998, 33(Suppl. 1):S87–S94.
20. Dombois OT et al. Collaboration between the health and transport sectors in promoting physical activity: examples from European countries. Hepa Europe European Network For The Promotion Of Health-Enhancing Physical Activity, Report 2006.

21. Palmer J, Leontos C. Nutrition training for chefs: taste as an essential determinant of choice. *Journal of the American Dietetic Association*, 1995, 95(12):1418–1421.
22. Russell WD, Hutchinson J. Comparison of health promotion and deterrent prompts in increasing use of stairs over escalators. *Perceptual and Motor Skills*, 2000, 91(1):55–61.
23. Stahl T et al. The importance of policy orientation and environment on physical activity participation—a comparative analysis between Eastern Germany, Western Germany and Finland. *Health Promotion International*, 2002, 17(3):235–246.
24. Staunton CE, Hubsmith D, Kallins W. Promoting safe walking and biking to school: the Marin County success story. *American Journal of Public Health*, 2003, 93(9):1431–1434.
25. Steenhuis I et al. The effectiveness of nutrition education and labelling in Dutch supermarkets. *American Journal of Health Promotion*, 2004, 18:221–224.
26. Steenhuis I et al. Process evaluation of two environmental nutrition programmes and an educational nutrition programme conducted at supermarkets and worksite cafeterias in the Netherlands. *Journal of Human Nutrition and Dietetics*, 2004, 17(2):107–115.
27. Twiss J et al. Community gardens: lessons learned from California Healthy Cities and Communities. *American Journal of Public Health*, 2003, 93(9):1435–1438.
28. Uusitalo U et al. Fall in total cholesterol concentration over five years in association with changes in fatty acid composition of cooking oil in Mauritius: cross sectional survey. *British Medical Journal*, 1996, 313(7064):1044–1046.
29. Wright L, Montezuma R. *Reclaiming public space: the economic, environmental, and social impacts of Bogota's transformation*. In: Cities for People Conference, Walk21, 9-11 Jun 2004, Copenhagen, Denmark (http://eprints.ucl.ac.uk/110).
30. Ciclovías Unidas de las Américas (www.cicloviasunidas.org).
31. Bauman A et al. Evaluation of the national 'Push Play' campaign in New Zealand—creating population awareness of physical activity. *New Zealand Medical Journal*, 2003, 116(1179):U534.
32. Bauman AE et al. Impact of an Australian mass media campaign targeting physical activity in 1998. *American Journal of Preventive Medicine*, 2001, 21(1):41–47.
33. Bhalla V et al. Changes in levels of major cardiovascular risk factors in the multi-ethnic population in Singapore after 12 years of a national non-communicable disease intervention programme. *Singapore Medical Journal*, 2006, 47(1):841–850.
34. Carter BJ et al. Using media messaging to promote healthful eating and physical activity among urban youth. *Journal of Nutrition Education and Behavior*, 2005, 37(2):98–99.
35. Chew F, Palmer S. Television health promotion in four countries. *Nutrition*, 2005, 21(5):634–638.
36. Craig CL et al. Proximal impact of Canada on the Move: the relationship of campaign awareness to pedometer ownership and use. *Canadian Journal of Public Health*, 2006, 97(Suppl. 1): S21–S27, S22–S29.
37. Craig CL, Tudor-Locke C, Bauman A. Twelve-month effects of Canada on the Move: a population-wide campaign to promote pedometer use and walking. *Health Education Research*, 2007, 22(3):406–413.
38. Dixon H et al. Public reaction to Victoria's "2 Fruit 'n' 5 Veg Every Day" campaign and reported consumption of fruit and vegetables. *Preventive Medicine*, 1998, 27(4):572–582.
39. Foerster SB et al. California's "5-a-day—for better health" campaign: an innovative population-based effort to effect large scale dietary change. *American Journal of Preventive Medicine*, 1995, 11(2):124–131.
40. Goodman RM, Wheeler FC, Lee PR. Evaluation of the heart to heart project: lessons from a community-based chronic disease prevention project. *American Journal of Health Promotion*, 1995, 9(6):443–455.
41. Huhman M et al. Effects of a mass media campaign to increase physical activity among children: Year-1 results of the VERB campaign. *Pediatrics*, 2005, 116(2):277–284.
42. Kelder SH et al. Community-wide youth nutrition education: long-term outcomes of the Minnesota Heart Health Program. *Health Education Research*, 1995, 10(2):119–131.
43. Larsson I, Lissner L. The 'Green Keyhole' nutritional campaign in Sweden: do women with more knowledge have better dietary practices? *European Journal of Clinical Nutrition*, 1996, 50(5):323–328.
44. Matsudo V et al. Promotion of physical activity in a developing country: the Agita São Paulo experience. *Public Health Nutrition*, 2001, 5(1A):1–10.

45. Matsudo S et al. Physical activity promotion: Experiences and evaluation of the Agita Sao Paulo Program using the ecological mobile model. *Journal of Physical Activity and Health*, 2004, 1:81–97.
46. Matsudo SM et al. The Agita Sao Paulo Program as a model for using physical activity to promote health. *Pan American Journal of Public Health*, 2003, 14(4):265–272.
47. Miles A et al. Using the mass-media to target obesity: an analysis of the characteristics and reported behaviour change of participants in the BBC's 'Fighting Fat, Fighting Fit' campaign. *Health Education Research*, 2001, 16(3):357–372.
48. Nafziger AN et al. The Otsego-Schoharie healthy heart program: prevention of cardiovascular disease in the rural US. *Scandinavian Journal of Public Health*, 2001, 29(Suppl. 56):S21–S32.
49. Nishtar S et al. The National Action Plan for the Prevention and Control of Non-communicable Diseases and Health Promotion in Pakistan—Cardiovascular diseases. *Journal of the Pakistan Medical Association*, 2004, 54(Suppl. 3):S14–S25.
50. Nishtar S et al. Newspaper articles as a tool for cardiovascular prevention programs in a developing country. *Journal of Health Communication*, 2004, 9(4):355–369.
51. Nishtar S. et al. Posters as a tool for disseminating health related information in a developing country: a pilot experience. *Journal of the Pakistan Medical Association*, 2004, 54(9):456–460.
52. Plotnikoff RC et al. Characteristics of participants visiting the Canada on the move website. *Canadian Journal of Public Health*, 2006, 97(Suppl. 1):S28–S35, S30–S38.
53. Reger B et al. Wheeling Walks: A community campaign using paid media to encourage walking among sedentary older adults. *Preventive Medicine*, 2002, 35:285–292.
54. Reger B, Wootan MG, Booth-Butterfield S. Using mass media to promote healthy eating: A community-based demonstration project. *Preventive Medicine*, 1999, 29(5):414–421.
55. Reger-Nash B et al. BC Walks: Replication of a Communitywide Physical Activity Campaign. *Preventing Chronic Disease*, 2006, Epub 15 Jun.
56. Sarraf-Zadgan N et al. Isfahan Healthy Heart Program: A comprehensive integrated community-based program for cardiovascular disease prevention and control. *Acta Cardiologica*, 2003, 58(4):309–320.
57. Spence JC et al. Perceived neighbourhood correlates of walking among participants visiting the Canada on the Move website. *Canadian Journal of Public Health*, 2006, 97(Suppl. 1):S36–S40, S39–S44.
58. Tudor-Smith C et al. Effects of the Heartbeat Wales programme over five years on behavioural risks for cardiovascular disease: quasi-experimental comparison of results from Wales and a matched reference area. *British Medical Journal*, 1998, 316(7134):818–822.
59. van der Feen de Lille JC et al. Fat Watch: a nationwide campaign in The Netherlands to reduce fat intake—process evaluations. *Nutrition and Health*, 1998, 2(2):107–117.
60. van Wechem SN et al. Fat Watch: a nationwide campaign in The Netherlands to reduce fat intake—effect evaluation. *Nutrition and Health*, 1998, 12(2):119–130.
61. van Wechem SN et al. Results of a community-based campaign to reduce fat intake. *Nutrition and Health*, 1997, 11(3):207–218. 30
62. Wardle J et al. Mass education for obesity prevention: the penetration of the BBC's 'Fighting Fat, Fighting Fit' campaign. *Health Education Research*, 2001, 16(3):343–355.
63. Warm DL et al. The Heartbeat Award Scheme: An evaluation of catering practices. *Journal of Human Nutrition and Dietetics*, 1997, 10(3):171–179.
64. Young DR et al. Associations between changes in physical activity and risk factors for coronary heart disease in a community-based sample of men and women: the Stanford Five-City Project. *American Journal of Epidemiology*, 1993, 138(4):205–216.
65. Anderson AS et al. The impact of a school-based nutrition education intervention on dietary intake and cognitive and attitudinal variables relating to fruits and vegetables. *Public Health Nutrition*, 2005, 8(6):650–656.
66. Auld GW et al. Outcomes from a school-based nutrition education program using resource teachers and cross-disciplinary models. *Journal of Nutrition Education*, 1998, 30(5):268–280.
67. Baranowski T et al. Squire's Quest! Dietary outcome evaluation of a multimedia game. *American Journal of Preventive Medicine*, 2003, 24(1):52–61.
68. Baranowski T et al. The Fun, Food and Fitness Project (FFFP): the Baylor GEMS pilot study. *Ethnicity & Disease*, 2003, 13(1 Suppl. 1):S30–S39.
69. Baranowski T et al. Gimme 5 fruit, juice, and vegetables for fun and health: outcome evaluation. *Health Education & Behavior*, 2000, 27(1):96–111.

70. Bartholomew JB, Jowers EM. Increasing frequency of lower-fat entrees offered at school lunch: an environmental change strategy to increase healthful selections. *Journal of the American Dietetic Association*, 2006,106(2):248–252.
71. Bayne-Smith M et al. Improvements in heart health behaviors and reduction in coronary artery disease risk factors in urban teenaged girls through a school-based intervention: the PATH program. *American Journal of Public Health*, 2004, 94(9):1538–1543.
72. Beech BM et al. Child- and parent-targeted interventions: the Memphis GEMS pilot study. *Ethnicity & Disease*, 2003, 13(1 Suppl. 1):S40–S53.
73. Bere E et al. Outcome and process evaluation of a Norwegian school-randomized fruit and vegetable intervention: Fruits and Vegetables Make the Marks (FVMM). *Health Education Research*, 2006, 21(2):258–267.
74. Bere E, Klepp KI. Correlates of fruit and vegetable intake among Norwegian school children: parental and self reports. *Public Health Nutrition*, 2004, 7(8):991–998.
75. Bere E, Veierod MB, Klepp KI. The Norwegian School Fruit Programme: evaluating paid vs. no-cost subscriptions. *Preventive Medicine*, 2005, 41(2):463–470.
76. Bere E et al. Free school fruit—sustained effect 1 year later. *Health Education Research*, 2006, 21(2):268–275.
77. Birnbaum AS et al. Are differences in exposure to a multicomponent school-based intervention associated with varying dietary outcomes in adolescents? *Health Education & Behavior*, 2002, 29(4):427–443.
78. Caballero B et al. Pathways: a school-based, randomized controlled trial for the prevention of obesity in American Indian schoolchildren. *American Journal of Clinical Nutrition*, 2003, 78(5):1030–1038.
79. Cullen KW et al. Squire's Quest: intervention changes occurred at lunch and snack meals. *Appetite*, 2005, 45(2):148–151.
80. Cullen KW et al. Goal setting is differentially related to change in fruit, juice, and vegetable consumption among fourth-grade children. *Health Education & Behavior*, 2004, 31(2):258–269.
81. Davis SM et al. Pathways curriculum and family interventions to promote healthful eating and physical activity in American Indian schoolchildren. *Preventive Medicine*, 2003, 37:S24–S34.
82. Dollahite J et al. Impact of a school-based community intervention program on nutrition knowledge and food choices in elementary school children in the rural Arkansas delta. *Journal of Nutrition Education*, 1998, 30(5):289–301.
83. Dwyer JT et al. Improving school breakfasts: effects of the CATCH Eat Smart program on the nutrient content of school breakfasts. *Preventive Medicine*, 1996, 25(4):413–422.
84. Edmundson E et al. The effects of the child and adolescent trial for cardiovascular health upon psychosocial determinants of diet and physical activity behavior. *Preventive Medicine*, 1996, 25(4):442–454.
85. Engels HJ et al. Promoting healthful diets and exercise: efficacy of a 12-week after-school program in urban African Americans. *Journal of the American Dietetic Association*, 2005, 105(3):455–459.
86. Eriksen K et al. Effect of a fruit and vegetable subscription in Danish Schools. *Public Health Nutrition*, 2003, 6(1):57–63.
87. Fardy PS et al. Health promotion in minority adolescents: A healthy people 2000 pilot study. *Journal of Cardiopulmonary Rehabilitation*, 1995, 15(1):65–72.
88. Fardy PS et al. Coronary disease risk factor reduction and behavior modification in minority adolescents: the PATH program. *Journal of Adolescent Health*, 1996, 18(4):247–253.
89. Fitzgibbon ML et al. A community-based obesity prevention program for minority children: rationale and study design for Hip-Hop to Health Jr. *Preventive Medicine*, 2002, 34:289–297.
90. Fitzgibbon ML et al. Two-year follow-up results for Hip-Hop to Health Jr: a randomized controlled trial for overweight prevention in pre-school minority children. *Journal of Pediatrics*, 2005, 146:618–625.
91. Foerster SB et al. The California Children's 5-a-day - Power Play! campaign: evaluation of large scale social marketing initiative. *Family & Community Health*, 1998, 21(1):46–64.
92. French SA et al. An environmental intervention to promote lower-fat food choices in secondary schools: outcomes of the TACOS Study. *American Journal of Public Health*, 2004, 94(9):1507–1512.
93. French SA et al. School-based programmes to promote and increase availability of lower fat foods increases sales of lower fat foods to students. *Evidence-Based Healthcare and Public Health*, 2005, 9(2):141–142.
94. Frenn M et al. Addressing health disparities in middle school students' nutrition and exercise. *Journal of Community Health Nursing*, 2003, 20(1):1–14.

95. Frenn M, Malin S, Bansal NK. Stage-based interventions for low fat diet with middle school students. *Journal of Pediatric Nursing*, 2003, 18(1):36–45.
96. Frenn M et al. Changing the tide: an Internet/video exercise and low fat diet intervention with middle-school students. *Applied Nursing Research*, 2005, 18(1):13–21.
97. Friel S et al. Evaluation of the Nutrition Education at Primary School (NEAPS) programme. *Public Health Nutrition*, 1999, 2(4):549–555.
98. Gittelsohn J et al. Pathways: lessons learned and future directions for school-based interventions among American Indians. *Preventive Medicine*, 2003, 37:S107–S112.
99. Going S et al. The effects of the Pathways Obesity Prevention Program on physical activity in American Indian children. *Preventive Medicine*, 2003, 37:S62–S69.
100. Gortmaker SL et al. Impact of a school-based interdisciplinary intervention on diet and physical activity among urban primary school children: eat well and keep moving. *Archives of Pediatrics & Adolescent Medicine*, 1999, 153(9):975–983.
101. Harrell JS et al. Effects of a school-based intervention to reduce cardiovascular disease risk factors in elementary-school children: the Cardiovascular Health in Children (CHIC) study. *Journal of Pediatrics*, 1996, 128(6):797–805.
102. Harrell JS et al. School-based interventions improve heart health in children with multiple cardiovascular disease risk factors. *Pediatrics*, 1998, 102(2):371–380.
103. Harrell JS et al. A public health vs a risk-based intervention to improve cardiovascular health in elementary school children: The cardiovascular health in children study. *American Journal of Public Health,* 1999, 89:1529–1535.
104. Harris KJ et al. Reducing elementary school children's risks for chronic diseases through school lunch modifications, nutrition education, and physical activity interventions. *Journal of Nutrition Education*, 1997, 29:196–202.
105. Harris KJ et al. Formative, process, and intermediate outcome evaluation of a pilot school-based 5-A-Day for Better Health Project. *American Journal of Health Promotion*, 1998, 12(6):378–381.
106. Hoelscher DM et al. School-based health education programs can be maintained over time: results from CATCH Institutionalization study. *Preventive Medicine*, 2004, 38(5):594–606.
107. Hoelscher DM et al. How the CATCH eat smart program helps implement the USDA regulations in school cafeterias. *Health Education & Behavior*, 2003, 30(4):434–446.
108. Hopper CA et al. The effects of a family fitness program on the physical activity and nutrition behaviors of third-grade children. *Research Quarterly for Exercise and Sport*, 2005, 76(2):130–139.
109. Jimenez MM et al. Comparison of the dietary intakes of two different groups of children (grades 4 to 6) before and after the Kahnawake Schools Diabetes Prevention Project. *Journal of the American Dietetic Association*, 2003, 103(9):1191–1194.
110. Kain J et al. School-based obesity prevention in children; methodology and evaluation of a controlled study. *International Journal of Obesity*, 2004, 28(4):483–493.
111. Kelder S et al. The CATCH Kids Club: a pilot after-school study for improving elementary students' nutrition and physical activity. *Public Health Nutrition*, 2005, 8(2):133–140.
112. Kelder SH et al. Tracking of Physical and Physiological Risk Variables among Ethnic Subgroups from Third to Eighth Grade: The Child and Adolescent Trial for Cardiovascular Health Cohort Study. *Preventive Medicine*, 2002, 34:324–333.
113. Kuczmarski MF, Aljadir L. Gem No. 364. Using food calendars to self-monitor: Got 5? Nutrition for kids program. *Journal of Nutrition Education & Behavior*, 2003, 35(5):269–270.
114. Long JD, Stevens KR. Using technology to promote self-efficacy for healthy eating in adolescents. *Journal of Nursing Scholarship*, 2004, 36(2):134–139.
115. Luepker RV et al. The child and adolescent trial for cardiovascular health (CATCH). *Journal of Nutritional Biochemistry*, 1998, 9:525–534.
116. Lytle LA et al. Influencing healthful food choices in school and home environments: Results from the TEENS study. *Preventive Medicine*, 2006, 43:8–13.
117. Lytle LA et al. School-based approaches to affect adolescents' diets: results from the TEENS study. *Health Education & Behavior*, 2004, 31(2):270–287.
118. Lytle LA et al. Changes in nutrient intakes of elementary school children following a school-based intervention: results from the CATCH Study. *Preventive Medicine*, 1996, 25(4):465–477.
119. Macaulay AC et al. The Kahnawake Schools Diabetes Prevention Project: intervention, evaluation, and baseline results of a diabetes primary prevention program with a native community in Canada. *Preventive Medicine*, 1997, 26(6):779–790.

120. Manios Y, Kafatos A. Health and nutrition education in elementary schools: changes in health knowledge, nutrient intakes and physical activity over a six year period. *Public Health Nutrition*, 1999, 2(3A):445–448.
121. Manios Y, Kafatos A, Mamalakis G. The effects of a health education intervention initiated at first grade over a 3 year period: physical activity and fitness indices. *Health Education Research*, 1998, 13:593–606.
122. Manios Y et al. Evaluation of a health and nutrition education program in primary school children of Crete over a three-year period. *Preventive Medicine*, 1999, 28(2):149–159.
123. Manios Y et al. Health and nutrition education in primary schools of Crete: changes in chronic disease risk factors following a 6-year intervention programme. *British Journal of Nutrition*, 2002, 88(3):315–324.
124. McKenzie TL et al. Effects of the CATCH Physical Education Intervention: Teacher Type and Lesson Location. *American Journal of Preventive Medicine*, 2001, 21(2):101–109.
125. Nader PR et al. The effect of adult participation in a school-based family intervention to improve children's diet and physical activity: the child and adolescent trial for cardiovascular health. *Preventive Medicine*, 1996, 25(4):455–464.
126. Nader PR et al. Three-year maintenance of improved diet and physical activity: The CATCH cohort. *Archives of Pediatrics & Adolescent Medicine*, 1999, 153(7):695–704.
127. Naylor PJ et al. Action Schools! BC: A socioecological approach to modifying chronic disease risk factors in elementary school children. *Preventing Chronic Disease: Public Health Research, Practice and Policy*, 2006, 3(2):156.
128. Naylor PJ et al. Lessons learned from Action Schools! BC—an 'active school' model to promote physical activity in elementary schools. *Journal of Science and Medicine in Sport*, 2006, 9(5):413–423.
129. Nicklas TA et al. Outcomes of a high school program to increase fruit and vegetable consumption: Gimme 5—a fresh nutrition concept for students. *Journal of School Health*, 1998, 68(6):248–253.
130. Nicklas TA et al. Development of a school-based nutrition intervention for high school students: Gimme 5. *American Journal of Health Promotion*, 1997, 11(5):315–322.
131. Nicklas TA, O'Neil CE. Process of conducting a 5-a-day intervention with high school students: Gimme 5 (Louisiana). *Health Education & Behavior*, 2000, 27(2):201–212.
132. O'Neil CE, Nicklas TA. Gimme 5: An innovative, school based nutrition intervention for high school students. *Journal of the American Dietetic Association*, 2002, 102(3 Suppl. 1):S93–S96.
133. Osganian SK et al. Changes in the nutrient content of school lunches: results from the CATCH Eat Smart Food service Intervention. *Preventive Medicine*, 1996, 25(4):400–412.
134. Paradis G et al. Impact of a diabetes prevention program in body size, physical activity, and diet among Kanien'keha:ka (Mohawk) children 6 to 11 years old: 8 year results from the Kahnawake Schools Diabetes Prevention Project. *Pediatrics*, 2005, 115(2):333–339.
135. Payne J, Capra S, Hickman I. Residential camps as a setting for nutrition education of Australian girls. *Australian and New Zealand Journal of Public Health*, 2002, 26(4):383–388.
136. Perry CL et al. Changing fruit and vegetable consumption among children: the 5-a-Day Power Plus program in St. Paul, Minnesota. *American Journal of Public Health*, 1998, 88(4):603–609.
137. Perry CL et al. A randomized school trial of environmental strategies to encourage fruit and vegetable consumption among children. *Health Education & Behavior*, 2004, 31(1):65–76.
138. Perry CL et al. Effects of the Child and Adolescent Trial for Cardiovascular Health (CATCH) on fruit and vegetable intake. *Journal of Nutrition*, 1998, 30(6):354–360.
139. Prell HC et al. A school-based intervention to promote dietary change. *Journal of Adolescent Health*, 2005, 36(6):515–529.
140. Reger B et al. 1% or less: a community-based nutrition campaign. *Public Health Reports*, 1998, 113(5):410–419.
141. Reynolds KD et al. Increasing the fruit and vegetable consumption of fourth-graders: results from the high 5 project. *Preventive Medicine*, 2000, 30(4):309–319.
142. Reynolds KD et al. Methods, results, and lessons learned from process evaluation of the high 5 school-based nutrition intervention. *Health Education & Behavior*, 2000, 27(2):177–186.

143. Rinderknecht K, Smith C. Social cognitive theory in an after-school nutrition intervention for urban Native American youth. *Journal of Nutrition Education & Behavior*, 2004, 36(6):298–304.
144. Ritenbaugh C et al. A lifestyle intervention improves plasma insulin levels among Native American high school youth. *Preventive Medicine*, 2003, 36:309–319.
145. Robinson TN et al. Dance and reducing television viewing to prevent weight gain in African-American girls: the Stanford GEMS pilot study. *Ethnicity & Disease*, 2003, 13 (1 Suppl. 1):S65–S77.
146. Sahota P et al. Randomised controlled trial of primary school based intervention to reduce risk factors for obesity. *British Medical Journal*, 2001, 323(7320):1029–1032.
147. Sahota P et al. Evaluation of implementation and effect of primary school based intervention to reduce risk factors for obesity. *British Medical Journal*, 2001, 323(7320):1027–1029.
148. Saksvig BI et al. A pilot school-based healthy eating and physical activity intervention improves diet, food knowledge, and self-efficacy for native Canadian children. *Journal of Nutrition*, 2005, 135(10):2392–2398.
149. Sallis JF et al. Environmental interventions for eating and physical activity: a randomized controlled trial in middle schools. *American Journal of Preventive Medicine*, 2003, 24(3):209–217.
150. Salmon J et al. Reducing sedentary behaviour and increasing physical activity among 10-year old children: overview and process evaluation of the 'Switch-Play' intervention. *Health Promotion International*, 2005, 20:7–17.
151. Schinke SP et al. Reducing cancer risk among Native American adolescents. *Preventive Medicine*, 1996, 25(2):146–155.
152. Schofield L, Mummery WK, Schofield G. Effects of a controlled pedometer-intervention trial for Low-Active Adolescent Girls. *Medicine and Science in Sports and Exercise*, 2005, 37:1414–1420.
153. Shi-Chang X et al. Creating health-promoting schools in China with a focus on nutrition. *Health Promotion International*, 2004, 19(4):409–418.
154. Simon C et al. ICAPS: a multilevel program to improve physical activity in adolescents. *Diabetes & Metabolism*, 2006, 32(1):41–49.
155. Simon C et al. Intervention centred on adolescents' physical activity and sedentary behaviour (ICAPS): concept and 6-month results. *International Journal of Obesity and Related Metabolic Disorders*, 2004, 28(Suppl. 3):S96–S103.
156. Teufel NI et al. Pathways family intervention for third-grade American Indian children. *American Journal of Clinical Nutrition*, 1999, 69(Suppl.):S803–S809.
157. Steckler A et al. Pathways process evaluation results: a school-based prevention trial to promote healthful diet and physical activity in American Indian third, fourth and fifth grade students. *Preventive Medicine*, 2003, 37(6):S80–S90.
158. Stevens J et al. The impact of the Pathways intervention on psychosocial variables related to diet and physical activity in American Indian schoolchildren. *Preventive Medicine*, 2003, 37(6):S70–S79.
159. Story M et al. 5-a-Day Power Plus: Process evaluation of a multicomponent elementary school program to increase fruit and vegetable consumption. *Health Education & Behavior*, 2000, 27(2):187–200.
160. Story M et al. An after-school obesity prevention program for African-American girls: the Minnesota GEMS pilot study. *Ethnicity & Disease*, 2003, 13(1 Suppl. 1): S54–S64.
161. Trevino RP et al. Bienestar: a diabetes risk-factor prevention program. *Journal of School Health*, 1998, 68:62–67.
162. Trevino RP et al. Impact of the Bienestar school-based diabetes mellitus prevention program on fasting capillary glucose levels: a randomized controlled trial. *Archives of Pediatrics & Adolescent Medicine*, 2004, 158(9):911–917.
163. van Beurden E et al. Can we skill and activate children through primary school physical education lessons? "Move it Groove it"—a collaborative health promotion intervention. *Preventive Medicine*, 2003, 36:493–501.
164. Wang LY et al. Economic analysis of a school-based obesity prevention program. *Obesity Research*, 2003, 11(11):1313–1324.
165. Warren JM et al. Evaluation of a pilot school programme aimed at the prevention of obesity in children. *Health Promotion International*, 2003, 18(4):287–296.
166. Webber LS et al. Cardiovascular risk factors among children after a 2 1/2-year intervention—The CATCH study. *Preventive Medicine*, 1996, 25:432–441.
167. Wechsler H et al. Promoting the selection of low fat milk in elementary school cafeterias in an inner-city Latino community: Evaluation of an intervention. *American Journal of Public Health*, 1998, 88(3):427–433.

168. Wiecha JL et al. Diffusion of an integrated health education program in an urban school system: Planet Health. *Journal of Pediatric Psychology*, 2004, 29(6):467–474.
169. Williams CL et al. "Healthy-start": outcome of an intervention to promote a heart healthy diet in preschool children. *Journal of the American College of Nutrition*, 2002, 21(1):62–71.
170. Williams CL et al. Cardiovascular risk reduction in preschool children: The "Healthy Start" project. *Journal of the American College of Nutrition*, 2004, 23(2):117–123.
171. Yin Z et al. An after-school physical activity programme for obesity prevention in children—The Medical College of Georgia FitKid Project. *Evaluation and the Health Professions*, 2005, 28: 67–89.
172. Aldana SG et al. The effects of a worksite chronic disease prevention program. *Journal of Occupational and Environmental Medicine*, 2005, 47(6):558–564.
173. Armitage CJ, Conner M. Efficacy of a minimal intervention to reduce fat intake. *Social Science & Medicine*, 2001, 52(10):1517–1524.
174. Backman DR, Carman JS, Aldana SG. Fruits and vegetables and physical activity at the worksite: business leaders and working women speak out on access and environment. Sacramento, CA, California Department of Health Services (www.dhs.ca.gov/cdic/CPNS/ca5aday/default.htm, accessed May 2008).
175. Beresford SA et al. Seattle 5-a-Day Work-Site Project: process evaluation. *Health Education & Behavior*, 2000, 27(2):213–222.
176. Beresford SA et al. Seattle 5-a-Day Worksite Program to increase fruit and vegetable consumption. *Preventive Medicine*, 2001, 32(3):230–238.
177. Biener L et al. Impact of the Working Well Trial on the worksite smoking and nutrition environment. *Health Education & Behavior*, 1999, 26(4):478–494.
178. Braeckman L et al. Effects of a low-intensity worksite-based nutrition intervention. *Occupational Medicine (Oxford, England)*, 1999, 49(8):549–555.
179. Brug J et al. The impact of a computer-tailored nutrition intervention. *Preventive Medicine*, 1996, 25(3):236–242.
180. Buller DB et al. Randomized trial testing the effect of peer education at increasing fruit and vegetable intake. *Journal of the National Cancer Institute*, 1999, 91(17):1491–1500.
181. Buller D et al. Implementing a 5-a-day peer health educator program for public sector labor and trades employees. *Health Education & Behavior*, 2000, 27(2):232–240.
182. Byers T et al. The costs and effects of a nutritional education program following work-site cholesterol screening. *American Journal of Public Health*, 1995, 85(5):650–655.
183. Campbell MK et al. Effects of a tailored health promotion program for female blue-collar workers: health works for women. *Preventive Medicine*, 2002, 34(3):313–323.
184. Chan CB, Ryan DA, Tudor-Locke C. Health benefits of a pedometer-based physical activity intervention in sedentary workers. *Preventive Medicine*, 2004, 39:1215–1222.
185. Cook C et al. Changing risk behaviours for non-communicable disease in New Zealand working men—is workplace intervention effective? *New Zealand Medical Journal*, 2001, 114(1130):175–178.
186. Dishman RK et al. Worksite physical activity interventions. *American Journal of Preventive Medicine*, 1998, 15(4):344–361.
187. Elbel R at al. A pilot study evaluating a peer led and professional led physical activity intervention with blue-collar employees. *Work*, 2003, (21):199–210.
188. Elliot DL et al. The PHLAME firefighter's study: feasibility and findings. *American Journal of Health Behavior*, 2004, 28(1):13–23.
189. Emmons KM et al. The Working Healthy Project: a worksite health-promotion trial targeting physical activity, diet and smoking. *Journal of Occupational and Environmental Medicine*, 1999, 41(7):545–555.
190. Glanz K et al. Impact of work site health promotion on stages of dietary change: the Working Well Trial. *Health Education & Behavior*, 1998, 25(4):448–463.
191. Glasgow RE et al. Take Heart: results from the initial phase of a work-site wellness program. *American Journal of Public Health*, 1995, 85(2):209–216.
192. Glasgow RE et al. Take Heart II: replication of a worksite health promotion trial. *Journal of Behavioral Medicine*, 1997, 20:143–159.
193. Griffin-Blake CS, DeJoy DM. Evaluation of social-cognitive versus stage-matched, self-help physical activity interventions at the workplace. *American Journal of Health Promotion*, 2006, (20)3:200–209.
194. Harrell JS et al. An occupation based physical activity intervention program: improving fitness and decreasing obesity. *AAOHN: Journal of the American Association of Occupational Health Nurses*, 1996, 44(8):377–384.
195. Hartman TJ et al. Effects of a low fat, worksite intervention on blood lipids and lipoproteins. *Journal of Occupational and Environmental Medicine*, 1995, 37(6):690–696.

196. Hunt MK et al. Results of employee involvement in planning and implementing the Treatwell 5-a-Day work-site study. *Health Education & Behavior*, 2000, 27(2):223–231.
197. Hunt MK et al. Process tracking results from the Treatwell 5-a-Day Worksite Study. *American Journal of Health Promotion*, 2000, 14(3):179–187.
198. Holdsworth M, Haslam C, Raymond NT. Does the heartbeat award scheme change employees' dietary attitudes and knowledge? *Appetite*, 2000, 35(2):179–188.
199. Irvine AB et al. The effectiveness of an interactive mulitmedia program to influence eating habits. *Health Education Research*, 2004, 19(3):290–305.
200. Kao YH, Lu CM, Huang YC. Impact of a transtheoretical model on the psychosocial factors affecting exercise among workers. *Journal of Nursing Research*, 2002, 10(4):303–310.
201. Kristal AR et al. Mediating factors in dietary change: understanding the impact of a worksite nutrition intervention. *Health Education & Behavior*, 2000, 27(1):112–125.
202. Lassen A et al. Successful strategies to increase the consumption of fruits and vegetables: results from the Danish '6 a day' Work-site Canteen Model Study. *Public Health Nutrition*, 2004, 7(2):263–270.
203. Oenema A, Brug J. Feedback strategies to raise awareness of personal dietary intake: results of a randomized controlled trial. *Preventive Medicine*, 2003, 36(4):429–439.
204. Osteras H, Hammer S. The effectiveness of a pragmatic worksite physical activity program on maximal oxygen consumption and the physical activity level in healthy people. *Journal of Bodywork and Movement Therapies*, 2006, (10):51–57.
205. Patterson RE et al. Components of the Working Well Trial intervention associated with adoption of healthful diets. *American Journal of Preventive Medicine*, 1997, 13(4):271–276.
206. Pegus C et al. Effect of the Heart At Work program on awareness of risk factors, self-efficacy, and health behaviors. *Journal of Occupational and Environmental Medicine*, 2002, 44(3):228–236.
207. Pingle SR, Deshpande AK, Malik JS. Impact of intervention strategies for risk factor modification. *Indian Journal of Occupational and Environmental Medicine*, 2001, 5(2):91–95.
208. Plotnikoff RC et al. Efficacy of an E-mail intervention for the promotion of physical activity and nutrition behavior in the workplace context. *American Journal of Health Promotion*, 2005, 19(6):422–429.
209. Pohjonen T, Ranta R. Effects of worksite physical exercise intervention on physical fitness, perceived health status, and work ability among home care workers: five year follow-up. *Preventive Medicine*, 2001, 32(6):465–475.
210. Polacsek M et al. Move & Improve: A Worksite Wellness Program in Maine. *Preventing Chronic Disease*, 2006, 3(3)A101, Epub Jun 15.
211. Proper KI et al. Effect of individual counseling on physical fitness and health: A randomized control trial in a workplace setting. *American Journal of Preventive Medicine*, 2003, (24) 3:218–226.
212. Simmons D et al. A pilot diabetes awareness and exercise programme in a multiethnic workforce. *New Zealand Medical Journal*, 1996, (109):373–376.
213. Sorensen G et al. Work site-based cancer prevention: primary results from Working Well Trial. *American Journal of Public Health*, 1996, 86(7):939–947.
214. Sorensen G et al. The effects of a health promotion-health protection intervention on behavior change: the WellWorks Study. *American Journal of Public Health*, 1998, 88(11):1685–1690.
215. Sorensen G, Stoddard A, Macario E. Social support and readiness to make dietary changes. *Health Education & Behavior*, 1998, 25(5):586–598.
216. Sorensen G et al. A comprehensive worksite cancer prevention intervention: behaviour change results from a randomised controlled trial. *Cancer Causes and Control*, 2002, 13(6):493–502.
217. Sorensen G et al. Increasing fruit and vegetable consumption through worksites and families in the Treatwell 5-a-day study. *American Journal of Public Health*, 1999, 89(1):54–60.
218. Steenhuis I et al. The impact of educational and environmental interventions in Dutch worksite cafeterias. *Health Promotion International*, 2004, 19(3):335–343.
219. Strychar IM et al. Impact of receiving blood cholesterol test results on dietary change. *American Journal of Preventive Medicine*, 1998, 14(2):103–110.
220. Tilley BC et al. Nutrition Intervention for High-Risk Auto Workers: Results of the Next Step Trial. *Preventive Medicine*, 1999, 28:284–292.
221. van Wier MF et al. ALIFE@Work: a randomized controlled trial of a distance counseling lifestyle programme for weight control among an overweight working population. *BMC Public Health*, 2006, 24(6):140.

222. Aldana SG et al. Effects of an intensive diet and physical activity modification program on the health risks of adults. *Journal of the American Dietetic Association*, 2005, 105(3):371–381.
223. Anderson ES et al. A computerized social cognitive intervention for nutrition behavior: direct and mediated effects on fat, fiber, fruits, and vegetables, self-efficacy, and outcome expectations among food shoppers. *Annals of Behavioral Medicine*, 2001, 23(2):88–100.
224. Anderson JV et al. 5-a-Day fruit and vegetable intervention improves consumption in a low income population. *Journal of the American Dietetic Association*, 2001, 101(2):195–202.
225. Armitage CJ. Evidence that implementation intentions reduce dietary fat intake: a randomized trial. *Health Psychology*, 2004, 23(3):319–323.
226. Auslander W et al. A controlled evaluation of staging dietary patterns to reduce the risk of diabetes in African-American Women. *Diabetes Care*, 2002, 25(5):809–814.
227. Aziz KU et al. Efficacy of CVD risk factor modification in a lower-middle class community in Pakistan: the Metroville Health Study. *Asia-Pacific Journal of Public Health*, 2003, 15(1):30–36.
228. Backman DR, Gonzaga GC. Media, festival, farmers/flea market, and grocery store interventions (www.dhs.ca.gov/cdic/CPNS/ca5aday/default.htm, accessed May 2008).
229. Block G et al. A randomized trial of the Little by Little CD-ROM: demonstrated effectiveness in increasing fruit and vegetable intake in a low-income population. *Preventing Chronic Disease*, 2004, 1(3):A08.
230. Brown BJ, Hermann JR. Cooking classes increase fruit and vegetable intake and food safety behaviors in youth and adults. *Journal of Nutrition Education and Behavior*, 2005, 37(2):104–105.
231. Burke V et al. Physical activity and nutrition programs for couples: a randomized controlled trial. *Journal of Clinical Epidemiology*, 2003, 56(5):421–432.
232. Burke V et al. Changes in cognitive measures in a randomized controlled trial of a health promotion program for couples targeting diet and physical activity. *American Journal of Health Promotion*, 2004, 18(4):300–311.
233. Burney J, Haughton B. EFNEP: A nutrition education program that demonstrates cost-benefit. *Journal of the American Dietetic Association*, 2002, 102(1):39–45.
234. Campbell MK et al. A tailored multimedia nutrition education pilot program for low-income women receiving food assistance. *Health Education Research*, 1999, 14(2):257–267.
235. Carson JS, Hedl JJ. Smart Shoppers Tours: Outcome evaluation. *Journal of Nutrition Education*, 1998, 30(5):323–331.
236. Coates RJ et al. The Women's Health Trial Feasibility Study in Minority Populations: Changes in dietary intakes. *American Journal of Epidemiology*, 1999, 149(12):1104–1112.
237. Connell D, Goldberg JP, Folta SC. An intervention to increase fruit and vegetable consumption using audio communications: in-store public service announcements and audiotapes. *Journal of Health Communication*, 2001, 6(1):31–43.
238. Cox DN et al. Take Five, a nutrition education intervention to increase fruit and vegetable intakes: Impact on consumer choice and nutrient intakes. *British Journal of Nutrition*, 1998, 80(2):123–131.
239. De Bourdeaudhuij I, Brug J. Tailoring dietary feedback to reduce fat intake: an intervention at the family level. *Health Education Research*, 2000, 15(4):449–462.
240. de Nooijer J et al. Do implementation intentions help to turn good intentions into higher fruit intakes? *Journal of Nutrition Education and Behavior*, 2006, 38(1):25–29.
241. Delichatsios HK et al. Randomized trial of a "talking computer" to improve adults' eating habits. *American Journal of Health Promotion*, 2001, 15(4):215–224.
242. Devine CM, Farrell TJ, Hartman R. Sisters in health: experiential program emphasizing social interaction increases fruit and vegetable intake among low-income adults. *Journal of Nutrition Education and Behavior*, 2005, 37(5):265–270.
243. Diehl HA. Coronary risk reduction through intensive community-based lifestyle intervention: The Coronary Health Improvement Project (CHIP) experience. *American Journal of Cardiology*, 1998, 82(Suppl.) :T83–T87.
244. Dunn PC et al. At-home nutrition education for parents and 5- to 8-year-old children: The HomePlate pilot study. *Journal of the American Dietetic Association*, 1998, 98(7):807–809.

245. Dzator JA et al. A randomized trial of interactive group sessions achieved greater improvements in nutrition and physical activity at a tiny increase in cost. *Journal of Clinical Epidemiology*, 2004, 57(6):610–619.
246. Elder JP et al. Results of language for health: cardiovascular disease nutrition education for Latino English-as-a-second-language students. *Health Education & Behavior*, 2000, 27(1):50–63.
247. Englert et al. Rationale and design of the Rockford CHIP, a community-based coronary risk reduction program: results of a pilot phase. *Preventive Medicine*, 2004, 38(4):432–441.
248. Evans AE, Sawyer-Morse. The right bite program: a theory-based nutrition intervention at a minority college campus. *Journal of the American Dietetic Association*, 2002, 102(3 Suppl.):S89–S93.
249. Fitzgibbon ML, Gapstur SM, Knight SJ. Results of Mujeres Felices por ser Saludables: a dietary/breast health randomized clinical trial for Latino women. *Annals of Behavioral Medicine*, 2004, 28(2):95–104.
250. Foley RM, Pollard CM. Food Cent$—Implementing and evaluating a nutrition education project focusing on value for money. *Australian and New Zealand Journal of Public Health*, 1998, 22(4):494–501.
251. Frable PJ, Dart L, Bradley PJ. Healthy Weigh (El camino saludable) phase 1: a retrospective critical examination of program evaluation. *Preventing Chronic Disease*, 2006, 3(3):A98.
252. Goulet J et al. Effect of a nutritional intervention promoting the Mediterranean food pattern on plasma lipids, lipoproteins and body weight in healthy French-Canadian women. *Atherosclerosis*, 2003, 170(1):115–124.
253. Haire-Joshu D et al. A community outreach partnership to improve the diet of African Americans. *American Journal of Health Behavior*, 2001, 25:140–146.
254. Haire-Joshu D et al. Improving dietary behavior in African Americans: the Parents As Teachers High 5, Low Fat Program. *Preventive Medicine*, 2003, 36(6):684–691.
255. Hartman TJ et al. Results of a community-based low-literacy nutrition education program. *Journal of Community Health*, 1997, 22(5):325–341.
256. Havas S et al. Factors associated with fruit and vegetable consumption among women participating in WIC. *Journal of the American Dietetic Association*, 1998, 98(10):1141–1148.
257. Havas S et al. Final results of the Maryland WIC 5-A-Day Promotion Program. *American Journal of Public Health*, 1998, 88(8):1161–1167.
258. Hopper CA et al. The effects of a family fitness program on the physical activity and nutrition behaviors of third-grade children. *Research Quarterly for Exercise and Sport*, 2005, 76(2):130–139.
259. Howard-Pitney B et al. The Stanford Nutrition Action Program: a dietary fat intervention for low-literacy adults. *American Journal of Public Health*, 1997, 87(12):1971–1976.
260. Kellar I, Abraham C. Randomized controlled trial of a brief research-based intervention promoting fruit and vegetable consumption. *British Journal of Health Psychology*, 2005, 10(Pt 4):543–558.
261. Kiyu A et al. Evaluation of the Healthy Village program in Kapit district, Sarawak, Malaysia. *Health Promotion International*, 2006, 21(1):13–18.
262. Kristal AR et al. A randomized trial of a tailored, self-help dietary intervention: The puget sound eating patterns study. *Preventive Medicine*, 2000, 31(4):380–389.
263. Kuller LH et al. Women's Healthy Lifestyle Project: A randomised clinical Trial. *Circulation*, 2001, 103:32–44.
264. Leslie E et al. Engagement and retention of participants in a physical activity website. *Preventive Medicine*, 2005, 40(1):54–59.
265. Lutz SF et al. Innovative newsletter interventions improve fruit and vegetable consumption in healthy adults. *Journal of the American Dietetic Association*, 1999, 99(6):705–709.
266. Marcus AC et al. Increasing fruit and vegetable consumption among callers to the CIS: results from a randomized trial. *Preventive Medicine*, 1998, 27(5 Pt 2):S16–S28.
267. Marcus AC et al. A randomized trial of a brief intervention to increase fruit and vegetable intake: a replication study among callers to the CIS. *Preventive Medicine*, 2001, 33(3):204–216.
268. Maskens A. Potential use of the Web to improve dietary habits—the ECP Diet Web-1 Project. *IARC Scientific Publications*, 2002, 156:15–16.
269. McCoy MR et al. Evaluating an internet weight loss program for diabetes prevention. *Health Promotion International*, 2005, 20(3):221–228.
270. McKay HG et al. The diabetes network internet-based physical activity intervention: a randomized pilot study. *Diabetes Care*, 2001, 24(8):1328–1334.
271. Merom D et al. Process evaluation of the New South Wales Walk Safely to School Day. *Health Promotion Journal of Australia*, 2005, 16(2):100–106.

272. Miller SL, Reber RJ, Chapman-Novakofski K. Prevalence of CVD risk factors and impact of a two-year education program for premenopausal women. *Women's Health Issues,* 2001, 11(6):486–493.
273. Mohan V et al. Community Empowerment—A successful model for prevention of non-communicable diseases in India—the Chennai Urban Population Study (CUPS-17). *Journal of the Association of Physicians of India*, 2006, 54:858–862.
274. Napolitano MA et al. Evaluation of an internet-based physical activity intervention: a preliminary investigation. *Annals of Behavioral Medicine*, 2003, 25(2):92–99.
275. O'Loughlin J et al. Coeur en santé St-Henri—a heart health promotion programme in Montreal, Canada: design and methods for evaluation. *Journal of Epidemiology*, 1995, 49:495–502.
276. Papadaki A, Scott JA. The Mediterranean Eating in Scotland Experience project: Evaluation of an Internet-based intervention promoting the Mediterranean diet. *British Journal of Nutrition*, 2005, 94(2):290–298.
277. Pate RR et al. Evaluation of a community-based intervention to promote physical activity in youth: lessons from Active Winners. *American Journal of Health Promotion*, 2003, 17(3):171–182.
278. Ronda G et al. The Dutch Heart Health community intervention 'Hartslag Limburg': results of an effect study at individual level. *Health Promotion International*, 2004, 19(1):21–31.
279. Ronda G et al. The Dutch heart health community intervention 'Hartslag Limburg': results of an effect study at organizational level. *Public Health*, 2005, 119(5):353–360.
280. Rovniak LS et al. Enhancing theoretical fidelity: an e-mail-based walking program demonstration. *American Journal of Health Promotion*, 2005, 20(2):85–95.
281. Rowley KG et al. Improvements in circulating cholesterol, antioxidants, and homocysteine after dietary intervention in an Australian Aboriginal community. *American Journal of Clinical Nutrition*, 2001, 74(4):442–448.
282. Sadler MJ et al. Healthy Heart Store Tours—A useful communication tool? *Nutrition Bulletin*, 2003, 28(2):179–186.
283. Sauer ML et al. The Kate B. Reynolds smoking education lifestyle fitness improvement program: Preventing and reducing chronic disease in low-income North Carolina communities. *North Carolina Medical Journal*, 2006, 67(4):317–323.
284. Simkin-Silverman LR et al. Lifestyle intervention can prevent weight gain during menopause: results from a 5-year randomized clinical trial. *Annals of Behavioral Medicine*, 2003, 26(3):212–220.
285. Simkin-Silverman LR et al. Prevention of cardiovascular risk factor elevations in healthy premenopausal women. *Preventive Medicine*, 1995, 24(5):509–517.
286. Spittaels H, De Bourdeaudhuij I, Vandelanotte C. Evaluation of a website-delivered computer-tailored intervention for increasing physical activity in the general population. *Preventive Medicine*, 2006, Epub Dec 29.
287. Staten LK et al. Pasos Adelante: the effectiveness of a community-based chronic disease prevention program. *Preventing Chronic Disease*, 2005, 2(1):A18.
288. Stevens VJ et al. Randomized trial of a brief dietary intervention to decrease consumption of fat and increase consumption of fruits and vegetables. *American Journal of Health Promotion*, 2002, 16(3):129–134.
289. Stevens VJ et al. One-year results from a brief, computer-assisted intervention to decrease consumption of fat and increase consumption of fruits and vegetables. *Preventive Medicine*, 2003, 36(5):594–600.
290. Tate DF, Wing RR, Winett RA. Using Internet technology to deliver a behavioral weight loss program. *Journal of the American Medical Association*. 2001, 285(9):1172–1177.
291. Tufano JT Karras BT. Mobile eHealth interventions for obesity: a timely opportunity to leverage convergence trends. *Journal of Medical Internet Research*, 2005, 7(5):e58.
292. Wen LM et al. Promoting physical activity in women: evaluation of a 2-year community-based intervention in Sydney, Australia. *Health Promotion International*, 2002, 17(2):127–137.
293. Winkleby MA et al. Predicting achievement of a low fat diet: a nutrition intervention for adults with low literacy skills. *Preventive Medicine*, 1997, 26(6):874–882.
294. Wylie-Rosett J et al. Computerized weight loss intervention optimizes staff time: the clinical and cost results of a controlled clinical trial conducted in a managed care setting. *Journal of the American Dietetic Association*, 2001, 101:1155–1162.
295. Yajima S et al. Effectiveness of a community leaders' programme to promote healthy lifestyles in Tokyo, Japan. *Health Promotion International*, 2001, (3):235–43.

296. Yancey AK et al. Challenges in improving fitness: results of a community-based, randomized, controlled lifestyle change intervention. *Journal of Women's Health*, 2006, 15(4):412–429.
297. INTERVENT Lifestyle Management and Chronic Disease Risk Reduction Programs. Abstracts presented at national/international scientific meetings: 1998–2006 (www.interventusa.com/research/2006%20JUNE%20ABSTRACT%20SUMMARY%20LISTING.pdf).
298. Aittasalo M et al. A randomized intervention of physical activity promotion and patient self-monitoring in primary health care. *Preventive Medicine*, 2006, 42(1):40–46.
299. Albright CL et al. Incorporating physical activity advice into primary care: Physician- delivered advice within the activity counseling trial. *American Journal of Preventive Medicine*, 2000,18(3):225–234.
300. Anderson GL et al. Implementation of the Women's Health Initiative study design. *Annals of Epidemiology*, 2003, 13(9 Suppl.):S5–S17.
301. Baker AH, Wardle J. Increasing fruit and vegetable intake among adults attending colorectal cancer screening: the efficacy of a brief tailored intervention. *Cancer Epidemiology, Biomarkers & Prevention*, 2002, 11(2):203–206.
302. Becker DM et al. Impact of a community-based multiple risk factor intervention on cardiovascular risk in black families with a history of premature coronary disease. *Circulation*, 2005, 111(10):1298–1304.
303. Beresford SA et al. A dietary intervention in primary care practice: the Eating Patterns Study. *American Journal of Public Health*, 1997, 87(610):616.
304. Bowen DB et al. Results of an adjunct dietary intervention program in the Women's Health Initiative. *Journal of the American Dietetic Association*, 2002, 102(11):1631–1637.
305. Beresford SA et al. Low fat dietary pattern and risk of colorectal cancer: the Women's Health Initiative Randomised Controlled Dietary Modification Trial. *Journal of the American Medical Association*, 2006, 295(6):643–654.
306. Buijs R et al. Promoting participation: evaluation of a health promotion program for low income seniors. *Journal of Community Health Nursing*, 2003, 20(2):93–107.
307. Calfas KJ et al. A controlled trial of physician counseling to promote the adoption of physical activity. *Preventive Medicine*, 1996, 25(3):225–233.
308. Cavani V et al. Effects of a 6-week resistance training program on functional fitness of older adults. *Journal of Aging and Physical Activity*, 2002, 10:443–452.
309. Delichatsios H et al. EatSmart: Efficacy of a multifaceted preventive nutrition intervention in clinical practice. *Preventive Medicine*, 2001, 33(2):91–98.
310. Dowell AC et al. Prevention in practice: results of a 2-year follow-up of routine health promotion interventions in general practice. *Family Practice*, 1996, 13(4):357–362.
311. Eakin EG et al. Physical activity promotion in primary care: bridging the gap between research and practice. *American Journal of Preventive Medicine*, 2004, 27(4):297–303.
312. Elley CR et al. Effectiveness of counselling patients on physical activity in general practice: cluster randomised controlled trial. *British Medical Journal*, 2003, 326(7393):793.
313. Elley R et al. Cost-effectiveness of physical activity counselling in general practice. *New Zealand Medical Journal*, 2004, 117(1207):U1216.
314. Emmons KM et al. Cancer prevention among working class, multiethnic adults: results of the healthy directions-health centers study. *American Journal of Public Health*, 2005, 95(7):1200–1205.
315. Emmons KM et al. Project PREVENT: a randomized trial to reduce multiple behavioral risk factors for colon cancer. *Cancer Epidemiology, Biomarkers & Prevention,* 2005, 14(6):1453–1459.
316. Ettner SL. The relationship between continuity of care and the health behaviors of patients: does having a usual physician make a difference? *Medical Care*, 1999, 37(6):547–555.
317. Field K et al. Strategies for reducing coronary risk factors in primary care: which is most cost effective? *British Medical Journal*, 1995, 310:1109–1112.
318. Fries E et al. Randomized trial of a low-intensity dietary intervention in rural residents: The rural physician cancer prevention project. *American Journal of Preventive Medicine*, 2005, 28(2):162–168.
319. Fries E et al. A self-help intervention to change patient dietary behavior in rural communities. *Journal of Clinical Outcomes Management*, 2005, 12(4):180–183.
320. Green BB et al. Effectiveness of telephone support in increasing physical activity levels in primary care patients. *American Journal of Preventive Medicine*, 2002, 22(3):177–183.

321. Herbert JR et al. A dietitian-delivered group nutrition program leads to reductions in dietary fat, serum cholesterol, and body weight: the Worcester-Area Trial for Counselling in Hyperlipidaemia (WATCH). *Journal of the American Dietetic Association*, 1999, 99(5):544–552.
322. Hillsdon M et al. Advising people to take more exercise is ineffective: a randomized controlled trial of physical activity promotion in primary care. *International Journal of Epidemiology*, 2002, 31(4):808–815.
323. Hopkins S et al. Differences in eating pattern labels between maintainers and non-maintainers in the women's health initiative. *Journal of Nutrition Education & Behavior*, 2001, 33(5):278–283.
324. Howard BV et al. Low fat dietary pattern and risk of colorectal cancer: the Women's Health Initiative Randomised Controlled Dietary Modification Trial. *Journal of the American Medical Association*, 2006, 295 (6):639–649.
325. Howard BV et al. Low fat dietary pattern and risk of cardiovascular disease: the Women's Health Initiative Randomised Controlled Dietary Modification Trial. *Journal of the American Medical Association*, 2006, 295(6):655–666.
326. Hunt JR et al. Physician recommendations for dietary change: their prevalence and impact in a population-based sample. *American Journal of Public Health*, 1995, 85(5):722–726.
327. Hunt MK et al. Process evaluation of a clinical preventative nutrition intervention. *Preventive Medicine*, 2001, 33(2 Pt 1):82–90.
328. Huxley RR et al. Effect of dietary advice to increase fruit and vegetable consumption on plasma flavonol concentrations: results from a randomised controlled intervention trial. *Journal of Epidemiology and Community Health*, 2004, 58(4):288–289.
329. Jacobs AD et al. Effects of a tailored follow-up intervention on health behaviors, beliefs, and attitudes. *Journal of Women's Health (2002)*, 2004, 13(5):557–568.
330. Jilcott SB et al. Implementing the WISEWOMAN program in local health departments: Staff attitudes, beliefs, and perceived barriers. *Journal of Women's Health*, 2004, 13(5):598–606.
331. John JH et al. Effects of fruit and vegetable consumption on plasma antioxidant concentrations and blood pressure: a randomised controlled trial. *Lancet*, 2002, 359:1969–1974.
332. John JH et al. Does stage of change predict outcome in a primary-care intervention to encourage an increase in fruit and vegetable consumption? *Health Education Research*, 2003, 18(4):429–438.
333. John JH, Ziebland S. Reported barriers to eating more fruit and vegetables before and after participation in a randomised controlled trial: a qualitative study. *Health Education Research*, 2004, 19(2):165–174.
334. Kearney MH et al. Influences on older women's adherence to a low fat diet in the Women's Health Initiative. *Psychosomatic Medicine*, 2002, 64(3):450–457.
335. Kerse N et al. Is physical activity counseling effective for older people? A cluster randomized, controlled trial in primary care. *Journal of the American Geriatrics Society*, 2005, 53(11):1951–1956.
336. Langer RD et al. The women's health initiative observational study: Baseline characteristics of participants and reliability of baseline measures. *Annals of Epidemiology*, 2003, 13(9 Suppl.):S107–S121.
337. Langham S et al. Costs and cost effectiveness of health checks conducted by nurses in primary care: the Oxcheck study. *British Medical Journal*, 1996, 312:1265–1268.
338. Lazovich D et al. Implementing a dietary intervention in primary care practice: a process evaluation. *American Journal of Health Promotion*, 2000, 15(2):118–125.
339. Lobb R et al. Implementation of a cancer prevention program for working class, multiethnic populations. *Preventive Medicine*, 2004, 38(6):766–776. 208
340. Long BJ et al. A multi-site field test of the acceptability of physical activity counseling in primary care: Project PACE. *American Journal of Preventive Medicine*, 1996, 12(2):73–81.
341. Marcus BH et al. Training physicians to conduct physical activity counseling. *Preventive Medicine,* 1997, 26(3):382–388.
342. Mayer-Davis EJ et al. Pilot study of strategies for effective weight management in type 2 diabetes: Pounds Off with Empowerment (POWER). *Family & Community Health*, 2001, 24(2):27–35.
343. Mayer-Davis EJ et al. Pounds off with empowerment (POWER): a clinical trial of weight management strategies for black and white adults with diabetes who live in medically underserved rural communities. *American Journal of Public Health*, 2004, 94(10):1736–1742.
344. Neumark SD, Kaufmann NA, Berry EM. Physical activity within a community-based weight control program: program evaluation and predictors of success. *Public Health Reviews*, 1995, 23(3):237–251.

345. Ockene IS et al. Effect of training and a structured office practice on physician-delivered nutrition counseling: the Worcester-Area Trial for Counseling in Hyperlipidemia (WATCH). *American Journal of Preventive Medicine*, 1996, 12(4):252–258.
346. O'Halloran P et al. Effect of health lifestyle pattern on dietary change. *American Journal of Health Promotion*, 2001, 16(1):27–33.
347. Patterson RE. Dietary adherence in the women's health initiative dietary modification trial. *Journal of the American Dietetic Association*, 2004, 104(4):654–658.
348. Patterson RE et al. Changes in food sources of dietary fat in response to an intensive low fat dietary intervention: early results from the Women's Health Initiative. *Journal of the American Dietetic Association*, 2003, 103(4):454–460.
349. Prentice RL et al. Low fat dietary pattern and risk of invasive cancer: the Women's Health Initiative Randomised Controlled Dietary Modification Trial. *Journal of the American Medical Association*, 2006, 295(6):629–642.
350. Pritchard DA, Hyndman J, Taba F. Nutritional counselling in general practice: a cost-effective analysis. *Journal of Epidemiology & Community Health*, 1999, 53:311–316.
351. Redman S et al. Is the Australian National Heart Foundation programme effective in reducing cholesterol levels among general practice patients? *Health Promotion International*, 1995, 10(4):293–303.
352. Ritenbaugh C et al. The Women's Health Initiative dietary modification trial: Overview and baseline characteristics of participants. *Annals of Epidemiology*, 2003, 13(9 Suppl.):S87–S97.
353. Rosamond WD et al. Cardiovascular disease risk factor intervention in low-income women: The North Carolina WISEWOMAN Project. *Preventive Medicine*, 2000, 31:370–379.
354. Sacerdote C et al. Randomized controlled trial: Effect of nutritional counselling in general practice. *International Journal of Epidemiology*, 2006, 35(2):409–415.
355. Salminen M et al. Effects of a controlled family-based health education/counseling intervention. *American Journal of Health Behavior*, 2005, 29(5):395–406.
356. Staten LK et al. Provider counseling, health education, and community health workers: The Arizona WISEWOMAN project. *Journal of Women's Health*, 2004, 13(5):547–556.
357. Steptoe A et al. Behavioural counselling in general practice for the promotion of healthy behaviour among adults at increased risk of coronary heart disease: randomised trial. *British Medical Journal*, 1999, 319(7215):943–947.
358. Steptoe A et al. Behavioural counselling to increase consumption of fruit and vegetables in low income adults: randomized trial. *British Medical Journal*, 2003, 326(7394):855.
359. Steptoe A et al. The impact of behavioral counseling on stage of change in fat intake, physical activity, and cigarette smoking in adults at increased risk of coronary heart disease. *American Journal of Public Health*, 2001, 91(2):265–269.
360. Stolley MR, Fitzgibbon ML. Effects of an obesity prevention program on the eating behavior of African American mothers and daughters. *Health Education & Behavior*, 1997, 24(2):152–164.
361. Swinburn et al. The green prescription: a novel way of increasing uptake of physical activity. *New Zealand Public Health Report*, 1998, 5(4):25–26.
362. van Sluijs EM et al. Feasibility and acceptability of a physical activity promotion programme in general practice. *Family Practice*, 2004, 21(4):429–436.
363. Walker Z et al. Health promotion for adolescents in primary care: randomised controlled trial. *British Medical Journal*, 2002, 325(7363):524.
364. Green Prescription online (www.sparc.org.nz/getting-active/green-prescription/overview).
365. Imperial Cancer Research Fund OXCHECK Study Group. Effectiveness of health checks conducted by nurses in primary care: final results of the OXCHECK study. *British Medical Journal*, 1995, 310(6987):1099–1104.
366. PACE online (www.paceproject.org), accessed May 2007.
367. WISEWOMAN online (www.cdc.gov/wisewoman/).
368. Hageman PA, Walker SN, Pullen CH. Tailored versus standard internet-delivered interventions to promote physical activity in older women. *Journal of Geriatric Physical Therapy (2001)*, 2005, 28(1):28–33.
369. Jette AM et al. A home-based exercise program for nondisabled older adults. *Journal of the American Geriatrics Society*, 1996, 44:644–649.
370. Johnson DB et al. Increasing fruit and vegetable intake in homebound elders: The Seattle Seniors Farmers' Market Nutrition Pilot Program. *Preventing Chronic Disease*, 2004, 1(1):1–9.

371. Kolbe-Alexander TL, Lambert EV, Charlton KE. Effectiveness of a community based low intensity exercise program for older adults. *Journal of Nutrition, Health & Aging*, 2006, 10:21–29.
372. Li IC. The effectiveness of a health promotion programme for the low-income elderly in Taipei, Taiwan. *Journal of Community Health*, 2004, 29(6):511–525.
373. Martel GF et al. Strength training normalizes resting blood pressure in 65- to 73-year-old men and women with high normal blood pressure. *Journal of the American Geriatrics Society*, 1999, 47:1215–1221.
374. Miszko TA et al. Effect of strength and power training on physical function in community-dwelling older adults. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, 2003, 58:171–175.
375. Munro JF et al. Cost-effectiveness of a community based exercise programme in over 65 year olds: cluster randomised trial. *Journal of Epidemiology & Community Health*, 2004, 58:1004–1010.
376. Nelson ME et al. The effects of multidimensional home-based exercise on functional performance in elderly people. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, 2004, 59:154–160.
377. Ourania M et al. Effects of a physical activity program. The study of selected physical abilities among elderly women. *Journal of Gerontological Nursing*, 2003, 29:50–55.
378. Phelan EA et al. Outcomes of a community-based dissemination of the health enhancement program. *Journal of the American Geriatrics Society*, 2002, 50:1519–1524.
379. Schaller KJ. Tai Chi Chih: an exercise option for older adults. *Journal of Gerontological Nursing*, 1996, 22:12–17.
380. Shin Y. The effects of a walking exercise program on physical function and emotional state of elderly Korean women. *Public Health Nursing*, 1999, 16:146–154.
381. Smith LT et al. Qualitative assessment of participant utilization and satisfaction with the Seattle Senior Farmers' Market Nutrition Pilot Program. *Preventing Chronic Disease*, 2004, 1(1):A06.
382. Stewart AL et al. Physical activity outcomes of CHAMPS II: a physical activity promotion program for older adults. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, 2001, 56:M465–M470.
383. Wilcox S et al. Results of the first year of active for life: translation of 2 evidence-based physical activity programs for older adults into community settings. *American Journal of Public Health*, 2006, 96(7):1201–1209.
384. Campbell MK et al. Fruit and vegetable consumption and prevention of cancer: the Black Churches United for Better Health project. *American Journal of Public Health*, 1999, 89(9):1390–1396.
385. Campbell MK et al. Improving multiple behaviors for colorectal cancer prevention among African American church members. *Health Psychology*, 2004, 23(5):492–502.
386. Campbell MK et al. The North Carolina Black Churches United for Better Health Project: intervention and process evaluation. *Health Education & Behavior*, 2000, 27(2):241–253.
387. Campbell MK et al. Stages of change and psychosocial correlates of fruit and vegetable consumption among rural African-American church members. *American Journal of Health Promotion*, 1998, 12(3):185–191.
388. Fitzgibbon ML et al. Results of a faith-based weight loss intervention for black women. *Journal of the National Medical Association*, 2005, 97(10):1393–1402.
389. Kennedy BM et al. A pilot church-based weight loss program for African-American adults using church members as health educators: a comparison of individual and group intervention. *Ethnicity & Disease*, 2005, 15(3):373–378.
390. Resnicow K et al. Body and Soul. A dietary intervention conducted through African-American churches. *American Journal of Preventive Medicine*, 2004, 27(2):97–105.
391. Resnicow K et al. Results of the healthy body healthy spirit trial. *Health Psychology*, 2005, 24(4):339–348.
392. Resnicow K et al. A motivational interviewing intervention to increase fruit and vegetable intake through Black churches: results of the Eat for Life trial. *American Journal of Public Health*, 2001, 91(10):1686–1693.
393. Samuel-Hodge CD et al. A church-based diabetes self-management education program for African Americans with type 2 diabetes. *Preventing Chronic Disease*, 2006, 3(3):A93.

394. Simmons D et al. Tale of two churches: differential impact of a church-based diabetes control programme among Pacific Islands people in New Zealand. *Diabetic Medicine*, 2004, 21(2):122–128.
395. Wilcox S et al. Increasing physical activity among church members: community-based participatory research. *American Journal of Preventive Medicine*, 2007, 32(2):131–138.
396. Yanek LR et al. Project Joy: Faith based cardiovascular health promotion for African American women. *Public Health Report*, 2001, 116(Suppl. 1):68–81.

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