

**THE INFLUENCE OF SOCIAL AND CULTURAL CONTEXT ON
THE EFFECTIVENESS OF HEALTH BEHAVIOUR CHANGE
INTERVENTIONS IN RELATION TO
DIET, EXERCISE AND SMOKING CESSATION**

**Prepared by the Department of Practice and Policy,
School of Pharmacy, University of London on behalf of the
Centre for Public Health Excellence**

Professor David Taylor

Professor Michael Bury

Dr Natasha Campling

Dr Sarah Carter

Dr Sara Garfied

Dr Jenny Newbould

Dr Tim Rennie

Correspondence to:

Professor David Taylor
The Department of Practice and Policy
The School of Pharmacy, University of London
London WC1N 1AX
David.Taylor@Pharmacy.ac.uk



**The School of Pharmacy
University of London**

TABLE OF CONTENTS

	Summary	5
S.1	BACKGROUND	5
S.1.1	Review aims and structure	6
S.2	METHODOLOGY	7
S.2.1	Literature search	8
S.3	FINDINGS	9
S.3.1	Life stages	9
S.3.1.1	<i>Children</i>	9
S.3.1.1.1	<i>Diet</i>	9
S.3.1.1.2	<i>Weight control and obesity prevention</i>	11
S.3.1.1.3	<i>Physical activity</i>	12
S.3.1.1.4	<i>Smoking prevention in child populations</i>	12
S.3.1.2	<i>Health behaviour change in adolescence and early adulthood</i>	13
S.3.1.2.1	<i>Diet</i>	14
S.3.1.2.2	<i>Weight control and reduction in adolescent populations</i>	14
S.3.1.2.3	<i>Physical activity</i>	15
S.3.1.2.4	<i>Smoking prevention and cessation in adolescent populations</i>	16
S.3.1.3	<i>Pregnancy and the beginning of parenthood</i>	17
S.3.1.3.1	<i>Nutritional advice and support</i>	18
S.3.1.3.2	<i>Breast feeding</i>	18
S.3.1.3.3	<i>Smoking during and after pregnancy</i>	19
S.3.1.3.4	<i>Physical activity in pregnancy</i>	20
S.3.1.4	<i>Healthy behaviour promotion in adulthood</i>	20
S.3.1.4.1	<i>Healthy eating and weight control in adulthood</i>	20
S.3.1.4.2	<i>Promoting physical activity amongst adults</i>	22
S.3.1.4.3	<i>Smoking reduction and cessation in adult populations</i>	24
S.3.1.5	<i>Health behaviour change in the context of later life</i>	28
S.3.1.5.1	<i>Dietary interventions</i>	28
S.3.1.5.2	<i>Physical activity</i>	29
S.3.2	Gender and health behaviour changes	29
S.3.3	Income, social position and health	30
S.3.4	Ethnicity and health behaviour change	32
S.3.5	Place and health behaviours	33
S.3.6	Other context related influences on the effectiveness of interventions to promote behavioural change	33
S.4	DISCUSSION AND CONCLUSIONS	35
S.4.1	Conclusions: commissioning more relevant research	38
1.	BACKGROUND	40
1.1	The public's health gains in the twentieth century	40
1.2	The biological and epidemiological impacts of health behaviour changes	42
1.3	Review aims and structure	45
2.	METHODOLOGY	47
2.1	Literature search	47
2.2	Selection of studies for inclusion	48

2.3	Quality appraisal	49
2.4	Study categorisation	49
2.5	Assessing UK applicability	51
2.6	Synthesis	51
3.	FINDINGS	54
3.1	Life stages	54
3.1.1	Children	54
3.1.1.1	<i>Diet</i>	54
3.1.1.2	<i>Weight control and obesity prevention</i>	57
3.1.1.3	<i>Physical activity</i>	59
3.1.1.4	<i>Smoking prevention in child populations</i>	61
3.1.1.5	<i>Summary: Contextual influences on the effectiveness of health behaviour change interventions in children</i>	63
3.1.2	Health behaviour change in adolescence and early adulthood	64
3.1.2.1	<i>Diet</i>	65
3.1.2.2	<i>Weight control and reduction in adolescent populations</i>	66
3.1.2.3	<i>Physical activity</i>	67
3.1.2.4	<i>Smoking prevention and cessation in adolescent populations</i>	68
3.1.2.5	<i>Summary: Contextual influences on the effectiveness of health behaviour change interventions in adolescents and young adults</i>	71
3.1.3	Pregnancy, and the beginning of parenthood	71
3.1.3.1	<i>Nutritional advice and support</i>	72
3.1.3.2	<i>Breast feeding</i>	73
3.1.3.3	<i>Smoking during and after pregnancy</i>	74
3.1.3.4	<i>Physical activity in pregnancy</i>	77
3.1.3.5	<i>Summary: Contextual influences on the effectiveness of health behaviour change interventions in pregnancy and at the start of parenthood</i>	78
3.1.4	Healthy behaviour promotion in adulthood	79
3.1.4.1	<i>Healthy eating and weight control in adulthood</i>	79
3.1.4.2	<i>Promoting physical activity amongst adults</i>	82
3.1.4.3	<i>Smoking reduction and cessation in adult populations</i>	86
3.1.4.4	<i>Summary: Contextual influences on the effectiveness of health behaviour change interventions in working age adulthood</i>	92
3.1.5	Health behaviour change in the context of later life	93
3.1.5.1	<i>Dietary interventions</i>	93
3.1.5.2	<i>Physical activity</i>	94
3.1.5.3	<i>Summary: Health behaviour change in later life</i>	96
3.2	Gender and health behaviour changes	96
3.3	Income, social position and health	98
3.4	Ethnicity and health behaviour change	100
3.5	Place and health behaviours	102
3.6	Other context related influences on the effectiveness of interventions to promote behavioural change	102
4	DISCUSSION AND CONCLUSIONS	106
4.1	Summary of evidence	106
4.2	Personal choice and structural change	110
4.3	Conclusions: Commissioning more relevant research	113

APPENDICES	115
Appendix 1 The social determinants and economics of public health	116
Appendix 2 Critical Appraisal Tool	127
Appendix 3 Search strategy	129
Appendix 4 Report bibliography	131
Appendix 5 Flow chart of papers identified, received and screened	134
Appendix 6 Data extraction fields	135
Appendix 7 Evidence tables	136
Appendix 8 References of reviewed papers	180

SUMMARY

S.1 BACKGROUND

The National Institute for Health and Clinical Excellence (NICE) has been asked by the Department of Health to develop guidance on *'the most appropriate means of generic and specific intervention to support attitude and behaviour change at population and community levels'*. This review, undertaken by The School of Pharmacy, University of London, was, with five others, commissioned by NICE to support the preparation of its response to this request.

Behaviour change has often been conceptualised in social science based investigations related to the promotion of better health in essentially individual terms. But there is today increasing understanding of the influence that broader social and economic factors have on the operation of individual and family choice. This review sought to identify and evaluate evidence relating to how the social and cultural context in which people live influences the effectiveness of interventions to change health knowledge, attitudes, intentions and behaviours.

Relevant background factors relate to trends in health inequalities and the limitations of the data available on health behaviour change (HBC) interventions other than those relating to smoking prevention and cessation to impact upon population health. The average life expectancy for men and women living in England rose from about 50 years in 1900 to about 75 years for men and 80 for women in 2000. As against a national infant mortality rate of about 150 per 1000 in 1900, today's figure is 5 per 1,000. Even the most disadvantaged groups in what is now a more diverse population than ever before are unlikely to experience infant mortality rates of over 10 per 1,000. Such illustrative figures indicate that improvements in public health have benefited the whole of society. In absolute terms people in less advantaged social positions have gained more from such mortality reductions than professionals, and men and women in other more affluent and well-educated groups (Oliver et al 2002).

However, in relative terms the scale of health inequalities between social groups in this country (as defined, for example, via NS-SEC, the National Statistics Socio-

Economic Classification, and the previously used Registrar General system based on occupation) has widened in recent decades, in respect to both mortality and morbidity (Drever and Whitehead, 1997; *The Acheson Report*, 1998). Chronic illnesses and long term disability amongst older people are also more prevalent than ever before.

The reason why it is relatively easy to identify the cost effectiveness of interventions aimed at smoking prevention and cessation is because the effects of tobacco use on health have been robustly delineated, and because smoking is a relatively simple form of behaviour change. The effects of relevant interventions can therefore be expressed in what are from a public health perspective are highly meaningful dimensions, such as premature deaths avoided or years of disability saved. This allows the value realised for the money invested to be calculated in ways that are useful to high level policy makers.

But in fields like exercise promotion and diet there is more uncertainty about the extent to which changes in behaviour will endure, and in time lead to desired health gains. For instance, in relation to eating increased amounts of fruit and vegetables there are no robust controlled intervention studies of the latter's effects. Hence the size and nature of any significant contribution to population health remains uncertain (Contributors to the Cochrane Collaboration and the Campbell Collaboration 2000, **2+A** – for review grading schema see Section 2.)

S.1.1 Review aims and structure

Against this background, and the policy environment described in documents such as the White Paper *Choosing Health: Making Healthier Choices Easier* (DoH 2004) and the Prime Minister's recent statements on healthy living and the responsibilities of the government, the public and other stakeholders have in protecting and promoting better health (Blair 2006), the research question that the School of Pharmacy team was asked by NICE to address was: '*How does the social and cultural context in which people live influence the effectiveness of interventions to change (health) knowledge, intentions and behaviour?*'

The team was requested to use examples from the fields of smoking, physical activity and healthy eating, and specifically to consider the relevance of:

- *life course;*
- *gender;*
- *income and allied social positioning;*
- *ethnicity;*
- *place; and*
- *other variables highlighted by the literature.*

The search undertaken identified a large number of reviews. Seventy seven were finally included. This tertiary review's findings are presented in full in Section 3 of the main report, beginning with information and data on variations in the effectiveness of health behaviour change interventions at different life course stages. This is followed by sub-sections on gender, income and socio-economic positioning, ethnicity, place and other contextual variables not already addressed under the previous headings. The main conclusions and recommendations of this study are presented in full in Section 4 of the main report. The authors were also asked to consider information on the cost effectiveness of health behaviour changes, particularly when it was presented in the literature reviewed as a result of the main search process. Observations and conclusions relating to this area are presented in Appendix 1 of the main report.

S.2 METHODOLOGY

Because of the breadth of literature and the resource limitations set, a 'review-of-reviews' was conducted in order to provide the most comprehensive analysis possible in the circumstances. Meta-analytic and systematic reviews were included in the dataset. Each review was quality appraised by two independent reviewers. Those selected for inclusion were graded for quality and type according to the hierarchy of evidence set out in Table 4.1 of the NICE Public Health Guidance Manual. These are adapted from the Scottish Intercollegiate Guidelines Network (2001) - see Table S. 2.1 below.

Full details of the methodology can be found in Section 2.

Table S. 2.1 Levels of evidence, quality scores and UK applicability ratings

Levels of Evidence		
Level of evidence	Type of evidence	
1	Meta-analyses or systematic reviews of RCTs	
2	Meta-analyses or systematic reviews of non-randomised controlled trials, case-control studies, cohort studies, controlled before-and-after (CBA), interrupted time series (ITS), correlation studies	
3	Non-analytic studies (for example, case reports, case series)	
4	Expert opinion, formal consensus	
Quality scores		
Criteria	++	+
1. Was there a focused aim or research question?	Yes	Yes
2. Explicit inclusion / exclusion criteria	Yes	Yes
3. More than one assessor / selector	Yes	
4. Provide details of databases searched	Yes	Yes
5. Lists years searched	Yes	Yes
6. Followed up references in bibliographies	Yes	
7. Experts consulted for further sources		
8. Grey literature included / searched		
9. Specified search terms / strategy	Yes	Yes
10. Not restricted to English language papers only	Yes	
11. Quality assessed	Yes	Yes
12. Data supports conclusions	Yes	Yes
Notes: ++ must <i>at least</i> meet 10 criterion indicated above + must <i>at least</i> meet 7 criterion indicated above - 4 or less criteria		
UK applicability ratings		
Applicability to the UK setting was graded according to the NICE criteria (A-D):		
A. Includes UK studies		
B. Non-UK studies of interventions that would be most likely to equally apply to UK settings		
C. Non-UK studies that may have some application to UK settings but should be interpreted with caution. There may be strong cultural, ethnic, religious, climatic or institutional differences that would have impact on the effectiveness of the intervention if applied in the UK		
D. Non-UK studies that are clearly irrelevant to UK settings		

S.3 FINDINGS

As already described, this review of review's findings are presented first in the context of life stage, followed by sub-sections on gender, income and socio-economic positioning, ethnicity, place and other contextual variables not already addressed.

S.3.1 Life stages

S.3.1.1 Children

This sub-section is focused on the impacts that health behaviour change interventions have in children aged over one year.

S.3.1.1.1 Diet

There is uncertainty as to what patterns of food consumption are most beneficial during childhood, and the extent to which eating patterns acquired then are in reality significant determinants of healthy or unhealthy eating patterns in subsequent life stages (Tedstone et al 1998, **2+A**; Hider 2001, **2+B**). It should not be assumed that reducing fat or total calorific consumption is always beneficial for children. This means that the cost effectiveness of behaviour change interventions in children in relation to health outcomes is in many instances impossible to calculate.

However, Tedstone et al (1998, **2+A**) concluded that the evidence available (derived mainly from American studies) indicates that the nutritional knowledge of young children can be increased by pre-school inputs, and that involving parents (the key figures in most young children's environments) augments this effect. However, these authors did not find evidence demonstrating that such increases in knowledge have a significant impact on patterns of food consumption in such children. Other contextually related findings from this study included:

- if young children have opportunities experimentally to taste novel foods they are more likely subsequently to accept them;
- giving rewards for consuming items such as 'healthy' drinks may be counter-productive;

- knowledge gains from interventions made in the pre-school setting tend to be greater than those derived from interventions delivered in home settings; and
- supporting less advantaged mothers can effectively enable them to improve their children's diets and change associated behaviours.

A study more specifically focused on the effectiveness of interventions aimed at increasing fruit and vegetable consumption, found (on the basis of US data) that those involving parents of young children can prove effective in increasing the fruit and vegetable intake of the latter, reportedly by between 0.5 and 3 (50 gm) servings a day (Ciliska et al 2000, **2++B**). Ammerman et al, in two related studies (Ammerman et al 2001, **1+B**; Ammerman et al 2002, **2+B**), noted that children are (unlike adults) more likely to increase their fruit as opposed to their vegetable intake, and are also likely to reduce their total fat as opposed to selectively their saturated fat consumption.

An extensive review of reviews undertaken by contributors to the Cochrane Collaboration and the Campbell Collaboration (2000, **2+A**) also found that interactive school interventions are more effective at changing behaviour than non-interactive ones. With regard to (US) school children aged between eight and ten years a meta-analysis published in the late 1990s found evidence of a small to moderate positive effect ($d = 0.24$) for 'heart healthy' eating (McArthur 1998, **2+C**). Roe et al (1997, **2++A**) also observed that parental involvement is a component of many more effective school interventions to improve diet.

Shepherd et al (2001, **3+A**), in a systematic review of barriers to and facilitators of healthy eating in children and young adults, concluded that schools can provide an appropriate environment for the effective promotion of healthy eating, especially amongst young females. Their findings support 'whole School' contextual approaches, aimed in part at increasing access to 'healthy foods' and teaching skills relevant to preparing foods and resisting environmental pressures to eat unhealthily.

Evidence statements

There is evidence of good quality (Roe et al 1997, 2++A; Tedstone et al 1998, 2+A; Ciliska et al 2000, 2++B; Ammerman et al 2001, 1+B; Ammerman et al 2002, 2+B) that interventions aimed at supporting and involving the parents of children and programmes delivered in schools can increase children's fruit consumption, and have other desired diet related impacts.

There is evidence of good quality (Shepherd et al 2001, 3+A) that sustained 'whole School' approaches to promoting healthy eating are most likely to be effective, particularly among girls.

There is evidence of good quality (Contributors to the Cochrane Collaboration and the Campbell Collaboration 2000, 2+A) that changes in children's knowledge and attitudes towards healthy eating are not consistently linked to their behaviour.

The duration of interventional effects and the quanta of health gain derived from 'healthy eating' in childhood are uncertain (Tedstone et al 1998, 2+A; Hider 2001, 2+B).

S.3.1.1.2 Weight control and obesity prevention

Summerbell et al (2005, 2+A) systematically reviewed ten long term (intervention duration one year plus) and twelve short term (< one year duration) studies of programmes aimed at preventing obesity in children. The majority were set in schools and combined exercise and dietary components. Interventions of this type were in the main found to be ineffective in reducing the numbers of overweight individuals, although one study reported a reduction in young female (but not male) rates. This analysis again indicated that changes in knowledge and attitude do not consistently relate to behavioural change sufficient to promote desired health outcomes.

McLean et al (2003, 2-B) systematically reviewed literature on family involvement in weight control. They reported that targeting children and adults together can be beneficial for the former, in both the short and long term. They found that the greater the number of weight loss and control techniques taught to parents and children, the greater the likelihood of success.

Evidence statements

There is evidence of good quality (Summerbell et al 2005, 2+A) that programmes for child weight control and obesity prevention are of limited effectiveness, whether delivered in school or other settings.

There is evidence of mixed quality (Summerbell et al 2005, 2+A; McLean et al 2003, 2-B) that those aimed at promoting increased physical activity may have more effect than others aimed more broadly at dietary and exercise change. Involving parents and children together can also be beneficial.

S.3.1.1.3 Physical activity

Two reviews on the effectiveness of school based interventions for the promotion of physical exercise (Dobbins et al 2001, 2+A; Brunton et al 2003, 2+B) and the barriers and facilitators of physical activity in childhood were identified. Both offered limited, conflicting, evidence as to the value of school based interventions. Dobbins et al concluded that school based exercise interventions are generally ineffective in altering physical indicators of health status. They commented that there is very little high quality evidence showing that children exposed to school based interventions lead more active adult lives. Brunton et al (2003, 2+B) concluded that there is insufficient good quality research available on the effectiveness of interventions to promote childhood physical activity. But they emphasised that children have clear ideas regarding the barriers to and facilitators of physical activity that they experience and argued that more attention should be paid to the contextual determinants of children's physical activity patterns. These are of particular significant in children at high risk of social exclusion.

Evidence statements

There is good quality, though limited, evidence (Dobbins et al 2001, 2+A; Brunton et al 2003, 2+B) that appropriately designed schools based programmes can be effective in increasing physical activity levels. But there is little evidence that they have impacts of sufficient significance to alter health status in childhood or later life.

S.3.1.1.4 Smoking prevention in child populations

Christakis et al (2003, 1-A) systematically reviewed four studies on health care provider led interventions aimed at preventing child smoking. Three of these reported

negative findings. The other, which evaluated the impact of an intervention carried out in UK primary care/general practice in Oxfordshire showed a small impact, implying an NNT (number needed to treat) equivalent figure of 40-50.

In the schools context, Thomas (2002, 1+A) conducted a systematic review of programmes intended to prevent smoking. This author found, in line with research in other health behaviour change fields, that the provision of information alone is less effective than interventions that combine information provision with support designed to facilitate behaviour change. One reported study indicated that a programme aimed at promoting social competence (in essence, enhanced behavioural skills) that did not contain a specific anti-smoking component was (at least in the short term) associated with reduced smoking rates in boys, but not girls. Thomas noted the findings of a meta-analysis indicating that schools programmes aimed at children aged around eleven might typically reduce relative smoking rates by about 5 per cent.

Stead and Lancaster (2005a, 2-A) systematically reviewed studies on the prevention of cigarette sales to minors. They found that simply giving information to retailers is not effective, and that interventions aimed at educating the latter need to be backed by other measures, such as community support and enforcement checks.

Evidence statements

There is evidence of good quality (Thomas 2002, 1+A) that programmes on smoking prevention delivered in schools can have a limited impact on relative rates of smoking in children.

There is evidence of weak quality (Stead and Lancaster 2005a, 2-A) that restrictions on children's access to tobacco may augment such effects, providing that high rates of compliance are achieved throughout localities. But the overall impact of such interventions is uncertain. There is very little evidence of health care provider led initiatives having an impact on child smoking rates, although in England GP communications may be effective.

S.3.1.2 Health behaviour change in adolescence and early adulthood

Failures to understand with sufficient sensitivity the challenges that occur in the context of adolescence can undermine the effectiveness of HBC interventions. There is, for example, evidence that although schools programmes aimed at promoting safe

driving increase relevant knowledge they have paradoxical outcomes in males, essentially through increasing their desire to drive at an early age without significantly reducing the risk of their having accidents (Cochrane Injuries Group Driver Education Reviewers 2001).

S.3.1.2.1 Diet

Shepherd et al (2001, 3+A) found evidence that school based interventions can be effective in promoting increased fruit and vegetable consumption amongst adolescents, and that a ‘whole school’ approach involving both an increased availability of foods regarded as being ‘healthy’ coupled with other activities (like teaching cooking skills) and interventions such as media campaigns may be of particular value. Their conclusions were in line with other reviews relating to this area (Ciliska et al 2000, 2++B). Shepherd et al reported that successful dietary interventions at this life stage have been associated with small (< 5 per cent) falls in variables such as blood pressure. However, it is not possible to associate such results with long term health gains. The effects of school based interventions are likely to be greater in fifteen and sixteen year olds than in children, and are also more likely to be effective in young women than young men.

Evidence statements

There is limited evidence of good quality derived principally from US studies (Shepherd et al 2001, 3+A; Ciliska et al 2000, 2++B) that schools based programmes can promote behavioural changes such as increased fruit and (to a lesser degree) vegetable consumption more effectively in young adults than in children, and that young females may respond to such interventions more positively than males.

Young people believe that enhancing the provision of ‘healthy’ foods in environments they identify with would help promote dietary improvements.

S.3.1.2.2 Weight control and reduction in adolescent populations

Stuart et al (2005, 2+C) conducted an integrative review that found that schools programmes can facilitate weight control and loss through exercise promoting interventions for adolescents. The most substantive results (in one case a mean reduction of 4.5 per cent in body mass index as against controls given a placebo)

appeared to result from interventions that involved medicine use combined with diet and exercise change support. Stuart et al's overall conclusion was that, unlike the case with children and their families, parents and young adults should attend different groups in order to maximise the outcomes of weight control interventions. McLean et al (2003, **2-B**) also concluded that obese adolescents 'targeted' separately from their parents were more likely to lose significant amounts of weight than those sharing an interventional environment.

Several authors have warned that weight control and reduction programmes aimed at older children and young adults can have the undesired effect of causing (or precipitating) eating disorders in some young women and men. But this risk has not been quantified. It is also unclear as to the extent to which US based findings can meaningfully be extrapolated to UK social and economic contexts.

Evidence statements

There is mixed evidence, derived mainly from US studies (Stuart et al 2005, 2+C; McLean et al 2003, 2-B), that schools based exercise and dietary change programmes can be effective in helping to control or marginally reduce adolescent weight related problems.

Parental involvement can contribute to the effectiveness of interventions in this field (Stuart et al 2005, 2+C; McLean et al 2003, 2-B), although these sources also suggest that adolescents should be addressed in settings separate from those that their parents attend.

S.3.1.2.3 Physical activity

Dobbins et al (2001, **2+A**) found conflicting evidence on whether or not school based interventions increase physical activity rates in adolescents. There is very limited evidence that activity duration is affected by interventions made during this life stage (although one study included in these authors' review found this to be the case in adolescent females) and practically no significant evidence relating such interventions to substantive changes in health status. However, contextual variables like social norms and safe access to sports facilities or parks and countryside can influence physical activity rates among youths/young adults.

Evidence statements

There is limited good quality evidence (Dobbins et al 2001, 2+A) that physical activity rates in adolescent populations can be enhanced by interventions such as schools based exercise promotion programmes.

S.3.1.2.4 Smoking prevention and cessation in adolescent populations

Sowden and Stead (2003, 2-A) found limited evidence for the effectiveness of community interventions in preventing smoking in young people. Out of nine evaluations comparing intervention communities with no intervention control communities, only two reported significant outcomes. These authors concluded that community health behaviour change programmes must, to be successful, be targeted to reach their highest priority audiences, and be guided by both coherent theoretical frameworks and evidence based (local context sensitive, ‘market tested’) approaches to message design and delivery.

Thomas (2002, 1+A) also found partially conflicting evidence on the effectiveness of schools programmes for preventing smoking amongst children and adolescents. This review described one British study (Nutbeam 1993) that indicated that an intervention requiring families to discuss and discourage smoking together appeared to reduce the probability of young people remaining non-smokers, as against members of a control and an alternative intervention group.

The Academic and Public Health Consortium (2005, 2+A) found that there is insufficient evidence to determine the efficacy of brief smoking cessation interventions offered to groups such as students. However, McDonald et al (2003, 2-B) concluded that promising methods of support for adolescent smoking cessation have been developed, based primarily on the application of cognitive behavioural (CB) principles.

These authors found evidence that – unlike the case with adults – NRT use in the context of adolescent smoking cessation is relatively ineffective. The reasons for this may largely relate to there being a lower level of physiological addiction to nicotine in young as opposed to older smokers. Murphy-Hoefer et al (2005, 2+B) systematically reviewed interventions to reduce tobacco use in colleges and universities.

Interventions in student populations appear to be relatively effective in reducing smoking volumes and prevalence rates.

Harden et al (1999, **3+A**) and Posavac et al (1999, **2-B**) addressed the effectiveness of peer delivered health promotion interventions. In the youth smoking context Posavac et al reported small positive effects ($d = 0.19$ when controls received no alternative programme, and 0.02 when this was the case) while Harden et al found three positive outcome studies, one unclear and one that demonstrated that a peer led intervention was ineffective. Many young adults have a positive view of peer delivered health behaviour change initiatives. Harden et al found some evidence of greater effect in females, and that 'peer educators' are most likely to be high achieving young women.

Evidence statements

There is weak, yet limited, evidence (Sowden and Stead 2003, 2-A) that community interventions can in some circumstances reduce the number of adolescents taking up smoking.

There is good evidence (Thomas 2002, 1+A) that preventive school based programmes may be more effective, although the effect sizes reported are modest and some interventions aimed at reducing adolescent smoking have proven counter-productive.

There is limited evidence (McDonald et al 2003, 2-B) that with regard to enabling young smokers to quit, interventions based on cognitive behavioural principles are most effective.

There is mixed evidence (Murphy-Hoefer et al 2005, 2+B; Harden et al 1999, 3+A; Posavac et al 1999, 2-B) that interventions delivered in settings such as Universities and colleges, and that involve peer facilitation, can have higher success rates in promoting quitting and reductions in smoking frequency than interventions delivered to young adult populations via other routes.

S.3.1.3 Pregnancy and the beginning of parenthood

Variations in motivation for becoming pregnant and having a child may influence health related attitudes and behaviours during and after pregnancy (Cater and Coleman 2006). Issues relevant to pregnancy and health behaviour mentioned in the materials identified for this present analysis include women's nutrition (before and during pregnancy; decision making relating to breast feeding; smoking during and after pregnancy; and the value of physical activity during pregnancy.

S.3.1.3.1 Nutritional advice and support

Contento et al (1995, **3-B**) concluded that individualised education and support is the most effective approach to facilitating nutritional improvement amongst women who might otherwise fail to make optimal behavioural choices. Kramer and Kakuma (2003, **1-A**) conducted a systematic review of the effects of advice and allied interventions on energy and protein intake in pregnancy. Advice alone was shown to increase protein and energy intake, but no consistent effect on outcomes was observed. This is compatible with the findings of van Teijlingen et al (1998, **2+A**). However, Kramer and Kakuma also found that modest increases in maternal weight gain and mean birth weight could be achieved by augmented advice. That is, by advice combined with the provision of supplementary nutrition. Yet balanced protein/energy supplementation was not found to be especially beneficial in disadvantaged populations with poor access to high quality diets.

Evidence statements

There is mixed evidence (van Teijlingen et al 1998, 2+A; Kramer and Kakuma 2003, 1-A) that pregnant women and others of childbearing age are responsive to advice about healthy eating. But this is generally (outside specific contexts such as increasing folate consumption) ineffective in changing health outcomes for mothers and their infants.

There is weak evidence (Kramer and Kakuma 2003, 1-A) that balanced protein/energy dietary supplementation can reduce numbers of small for gestational age births, stillbirths and neonatal deaths in both affluent and disadvantaged populations.

S.3.1.3.2 Breast feeding

Contento et al (1995, **3-B**) reported evidence that decisions to breast-feed are often taken early in, or before, pregnancy. Breast feeding rates appear to be strongly influenced by cultural and immediate contextual considerations. Such findings have significant implications for the timing and design of interventions intended to promote and support breast feeding.

Evidence statement

There is evidence (Contento et al 1995, 3-B) that decisions about breast feeding are taken early in, or before, pregnancy.

S.3.1.3.3 Smoking during and after pregnancy

The Academic and Public Health Consortium study (2005, **2+A**) found a body of level 1+ evidence showing that brief interventions delivered as part of routine care for pregnant smokers are not effective in increasing quit rates. Lumley et al (2004, **2+A**) systematically reviewed 64 studies of more intensive interventions designed to reduce smoking during pregnancy. They found a fall of 6 per cent in the number of women continuing to smoke. The data gathered indicate statistically significant reductions in pre-term and low birth weight births resulting from such interventions.

Edwards et al (2000, **2++B**) and Hajek et al (2005, **1-A**) reviewed the effectiveness of interventions aimed at preventing smoking relapse postpartum. The former concluded that evidence is emerging that multi-component strategies of sufficient intensity and duration may reduce relapse rates. But Hajek et al found no benefit associated with both brief and skills based relapse prevention interventions for any group. Such research indicates that developing more effective smoking cessation interventions for men and women with infants and young children is a potentially important priority.

Krummel et al (2001, **2-B**) reported a Head Start (the US predecessor of the British Sure Start project) randomised controlled trial that was successful in doubling smoking abstinence rates in less advantaged black mothers with young children. This positive outcome was attributed to the combination of social support for the women involved coupled with the intervention's focus on child protection.

McBride et al (2003, **3-B**) argue that becoming aware of being pregnant represents for many women a 'teachable moment', or TMs. They argued that TMs provide a special contextual opportunity for health behaviour change interventions to be effective. However, the evidence base supporting this hypothesis is very limited.

Evidence statements

There is good evidence (Academic and Public Health Consortium study 2005, 2+A) that brief interventions delivered as part of routine care for pregnant smokers are not effective.

Overall, interventions during pregnancy have been found to increase quit rates by six per cent (Lumley et al 2004, 2+A).

There is no evidence (Hajek et al 2005, 1-A) that, despite high rates of postpartum relapse amongst women who quit during pregnancy, interventions designed to prevent this are effective.

There is limited evidence (McBride et al 2003, 3-B) that becoming pregnant provides a context within which health behaviour change is facilitated.

S.3.1.3.4 Physical activity in pregnancy

Kramer (2002) reviewed ten trials of interventions that involved advising pregnant women to take aerobic exercise (at least two or three sessions a week). This was found to increase fitness levels and body image. But it was not associated with any significant health risks or benefits for mothers or infants.

Evidence statement

There is no evidence (Kramer 2002) that taking regular aerobic exercise produces direct health benefits for pregnant women or their infants, although it may make pregnancy feel better for a proportion of women.

S.3.1.4 Healthy behaviour promotion in adulthood

S.3.1.4.1 Healthy eating and weight control in adulthood

Brunner et al (2005, 1++A) conducted a systematic review that included 29 papers describing 23 experimental studies of dietary interventions amongst adults. The overall results showed modest improvements in factors such as cholesterol levels and blood pressure, typically involving falls in the order of 2 to 5 per cent. They calculated that their findings (assuming that such reductions can be maintained in the long term) are indicative of an 11 to 12 per cent reduction in stroke and coronary heart disease incidence respectively. Brunner et al noted that women were more likely than men to reduce their dietary fat intake and to increase that of fruit and vegetables.

Effect sizes among individuals who knew that they were at increased risk of colorectal cancer were larger than average, while this was not the case for those with known raised cardiovascular disease risks. The behaviour of 'blue collar' participants in the studies included was less likely to change than that of other groups in the

population. These findings accord with those of other studies identified during this review of reviews. (See, for example, Ammerman et al 2001, **1+B**; Ammerman et al 2002, **2+B**; Ciliska et al 2000, **2++B**; Roe et al 1997, **2++A**; Hider 2001, **2+B**). Other relevant observations derived from these analyses include the following:

- A) Brunner et al found that dietary interventions delivered in workplace settings tended to have smaller effects than those in healthcare settings. Yet workplaces are important places for adult diet change related (and other) public health improvement programmes to focus on (Contento et al 1995, **3-B**; Peersman et al 1998, **1+B**). This is in part because worksite interventions can combine structural and environmental modifications with individually oriented support (and also group and employment linked influences) aimed at facilitating behavioural change (Engbers et al 2005, **2++B**). For example, ingredients used in preparing food obtained in the workplace can be altered. Low cost structural/environmental modification can also be derived from programmes aimed at, for instance, changing extra-workplace restaurant menus and cooking practices (Hider 2001, **2+B**).

- B) Appropriate family/partner involvement may enhance the impact of dietary and allied weight control interventions aimed at adults. Evidence on the impact of interventions such as worksite programmes on adult Body Mass Index (BMI) reductions appears generally disappointing (Engbers et al 2005, **2++B**). However, McLean et al (2003, **2-B**) found mixed evidence that supporting spouses together in weight maintenance and control programmes can increase their effectiveness. Supportive domestic environments and relationships are more likely to positively augment the effects of HBC interventions than critical ones.

- C) Ashenden et al (1997, **1+A**), in a systematic review covering ten dietary intervention trials in primary care, found very limited evidence of effectiveness. However, it is possible that the British primary care model offers relatively advantageous interventional opportunities in both the primary and secondary prevention contexts.

D) Interventions designed to be ethnically and culturally specific can promote enhanced outcomes within their target populations – see, for example, Ammerman et al (2001, **1+B**).

E) Evidence on the role of theoretical frameworks in enhancing the impact of dietary interventions in adults is conflicting. For example, Jepson (2000, **2+B**) concluded that dietary interventions based on theories of behavioural change are more likely to be effective than others. Yet Ammerman et al (2001, **1+B**) found that interventions employing a theoretical framework were not consistently more likely to report significant effects.

Evidence statements

There is good evidence (Ammerman et al 2001, 1+B; Ammerman et al 2002, 2+B; Brunner et al 2005, 1++A; Ciliska et al 2000, 2++B; Hider 2001, 2+B; Roe et al 1997, 2++A) that interventions of various types aimed at promoting diet related behavioural change among adults can deliver modest alterations in factors such as salt, fat and fruit intakes and cholesterol and blood pressure levels.

There is good evidence (Brunner et al 2005, 1++A) that suggests if this is sustained, these would be sufficient to permit relatively large public health gains.

There is mixed evidence (Contento et al 1995, 3-B; Peersman et al 1998, 1+B; Engbers et al 2005, 2++B; McLean et al 2003, 2-B) that opportunities exist further to improve the effectiveness of structural and individually oriented interventions to promote dietary behavioural changes in adults in contexts such as workplace programmes, family support and primary care.

S.3.1.4.2 Promoting physical activity amongst adults

Physical activity can complement a healthy eating strategy in helping to control obesity and promote fitness. There is evidence that middle aged Americans have twice the rate of diagnosed type 2 diabetes than that of their British counterparts (Banks et al 2006). This may be linked to variations in physical activity rates, together with other social and behavioural factors (Alberti 2006). There may also be interactions between exercise and smoking rates. For example, Nishi et al (1998, **1+B**) undertook a meta-analysis of the effect of group exercise programmes on smoking cessation rates. Their results indicate that successful smoking cessation and taking exercise tend to be positively linked.

Hillsdon et al (1995, **1+B**) and Hillsdon and Thorogood (1996) systematically reviewed randomised controlled trials of exercise promotion. Their conclusion was that exercise levels in adults can be increased and maintained by supportive interventions. The effectiveness of the latter is primarily associated with the promotion of increased physical activity rates in the context of home/normal daily living, rather than that of centre based activities. The promotion of moderate (brisk walking) as opposed to high intensity activities was found to be most likely to be successful. Enjoyability and convenience were also significant variables.

Blue and Conrad (1995, **2-B**) systematically reviewed 10 studies on worksite exercise adherence programmes. Overall, these were found to have a positive effect on exercise rates, although these authors noted a possible ‘dropping off’ in effectiveness over time.

Ashenden et al (1997, **1+A**), Lawlor and Hanratty (2001, **2++B**) and Petrella and Lattanzio (2002, **2-A**) all systematically reviewed sets of studies relating to the promotion of physical activity in general practice and other primary care settings, using brief advice and more intensive counselling techniques. They offer mixed evidence indicating that physician advice can increase physical activity levels, but not normally to a degree sufficient to improve fitness.

Morgan (2005, **2+A**) published a narrative review of evidence on the effectiveness of exercise referral schemes. It included studies from the UK, the US and New Zealand. Morgan concluded that exercise referral schemes can increase exercise rates in certain population sub-groups, and that motivational activities combined with exercise provision *per se* improve outcomes. With regard to the pursuit of additional possibilities for intervening at a public health as opposed to individual care level, Dishman and Buckworth (1996, **2-B**) argued that in aggregate the (highly heterogeneous) effect sizes associated with interventions aimed at promoting increased physical activity were sufficiently large to justify ‘accelerated attention in clinical trials’.

In the UK Ogilvie et al (2004, **2-A**) sought to assess the effectiveness of interventions to promote shifts from using cars to walking and cycling, and what health gains might

occur as a result. They found that targeted behaviour change programmes can change the habits of motivated subgroups, and that this might at a population level result in up to 5 per cent of all trips being switched away from cars. Interventions such as the provision of new railway stations and subsidies for preferred commuting patterns were found to be effective. But such they may also increase social class related health inequalities.

Evidence statements

There is mixed evidence (Hillsdon et al 1995, 1+B; Dishman and Buckworth 1996, 2-B) that health behaviour change interventions can to a moderate degree increase physical activity rates in adults. These can be delivered in a range of settings, including work places and primary health care (Blue and Conrad 1995, 2-B; Ashenden et al 1997, 1+A; Lawlor and Hanratty 2001, 2++B; Petrella and Lattanzio 2002, 2-A; Morgan 2005, 2+A).

To be sustained increased physical activity is better undertaken at home rather than in special centres, or otherwise to be integrated into normal daily life. There is weak evidence (Ogilvie et al 2004, 2-A) that health behaviour change interventions can help facilitate changes in contexts such as commuting.

S.3.1.4.3 Smoking reduction and cessation in adult populations

Over twenty reviews relevant to this area were identified via the search and inclusion process used for this review of reviews. Points of particular relevance are as follows:

- A) There is a robust body of evidence that interventions provided by health care professionals of many types can (cost effectively) enhance quit rates by in the order of 50 to 100 per cent (Academic and Public Health Consortium 2005, 2+A; Lancaster and Stead 2004, 2++A; Ashenden et al 1997, 1+A; Gorin and Heck 2004, 2-B; Rice and Stead 2004, 2+A; Blenkinsopp et al 2003, 2+A; Sinclair et al 2004, 1+A). But brief (*ad hoc*) advice on smoking cessation provided by doctors appears to be more effective than similar advice given by pharmacists and nurses. The latter appear better able to provide more intensive advice in settings such as clinics or booked sessions in pharmacies, and delivering cessation interventions for individuals at special risk.

- B) In relation to variations in the effectiveness of health behaviour interventions associated with professional status, Thompson et al (2003, 1++A) found that

dieticians were more effective than doctors in communicating about dietary change. Such differences may in part be associated with the expectations of message recipients regarding the roles of given professional groups.

- C) Lancaster and Stead (2004, **2++A**) found brief interventions by physicians to be relatively effective, quoting (with some caveats) an NNT (number needed to treat to achieve a single desired outcome) of 40. The data they presented indicated that the provision of more intensive interventions by physicians could approximately halve this figure. These authors argued that this would not represent a cost effective use of medical time. However, no data were given to support this conclusion. In fact, the available information suggests that smoking cessation is so beneficial that the additional medical time and other resources costs involved in providing intensive rather than brief interventions could well represent (notwithstanding the professional preferences involved) a good use of doctors' time, as well as that of other less well paid health service workers such as pharmacists and nurses (Rice and Stead 2004, **2+A**; Blenkinsopp et al 2003, **2+A**; Sinclair et al 2004, **1+A**).
- D) Moher et al (2005, **2+A**) found that group therapy, individual counselling and pharmacological treatments given to promote smoking cessation are as effective in the workplace as they are in other settings, such as those provided by health service providers. Using work place based strategies might allow relatively large proportions of the adult population to be reached.
- E) There is limited evidence that partner support might, if appropriately provided, enhance quit rates (Park et al 2004, **1+B**). These authors found that approaches in this area are more likely to be more effective among 'live in' partners and spouses, providing they focus on enhancing positive and supportive behaviours to smokers and on minimising negative and critical behaviours. These observations have important contextual implications. They imply that supportive as opposed to critical home settings are more likely to enable individuals to convert behavioural intentions into actions.

- F) Nicotine replacement therapy is a powerful behavioural change aid in the field of smoking cessation. It can often obviate the need for other forms of support. A number of the studies identified for this tertiary review explored the effects of interventions such as telephone support for individuals seeking to quit (Stead et al 2003, **1-B**), group therapy sessions (Stead and Lancaster 2005a, **2-A**), individual behavioural counselling (Lancaster and Stead 2005a, **1-A**) and the provision of self help materials (Lancaster and Stead 2005b, **1-A**). Alone, there is evidence that all these interventions can be effective. But a common finding to all these studies was that, when used in an adjuvant setting in which NRT was a component of the main intervention, their additional effects failed to reach significance.
- G) Jepson (2000, **2+B**) did not find sufficient evidence of the effectiveness of preventing smoking in public places to be able to draw a conclusion. Yet Serra et al (2000, **2+B**), in a review of uncontrolled studies specifically addressing this field, found a range of positive effects in institutions such as hospitals and workplaces. The Contributors to the Cochrane Collaboration and the Campbell Collaboration (2000, **2+A**) were supportive of the introduction of smoking bans, along with other population measures such as increasing the price of cigarettes and banning their advertising.
- H) The role of biomedical risk assessments in smoking cessation is uncertain. Bize et al (2005, **1+A**) found that although measures such as recording carbon monoxide and cotinine levels among quitters may be useful to researchers seeking to validate interventional trial outcomes, there is no evidence that this in itself influences outcomes.
- I) ‘Quit and Win’ contests and other forms of smoking cessation incentivisation through cash or other rewards are popular in some parts of the world, and have been encouraged by the WHO. However, two reviews by Hey and Perera (2005a, **2+B**; 2005b, **2+A**) question the effectiveness of such interventions. These authors found that overall less than one smoker in 500 quits because of entering such contests. Those who in the short term quit during such competitions do not in the longer term, after the prospect of a reward ceases,

appear to do any better than unsupported quitters. The significance of these observations relates to the issue of motivational context.

- J) Community level interventions for reducing smoking in adult populations appear to have very limited efficacy. A systematic review by Secker-Walker et al (2002, 2+A) noted the two most robust (in terms of randomisation and statistical power) studies included (out of a total of 34) did find an increase in quit rates. Women's attitudes may change more than men's in relation to such programmes, but men appear more likely to quit. These authors also found that longer duration interventions (> two years) appear to be more effective than shorter term ones. Secker-Walker et al's work highlights the difficulties involved in statistically correcting for factors such as base line variations and supervening secular trends in evaluating community level health behaviour change interventions. They describe related problems, like the diffusion of interventional components to outside areas. Such factors could lead to community level intervention effects being understated.

Evidence statements

There is good evidence (Academic and Public Health Consortium 2005, 2+A; Lancaster and Stead 2004, 2++A; Ashenden et al 1997, 1+A; Gorin and Heck 2004, 2-B; Rice and Stead 2004, 2+A; Blenkinsopp et al 2003, 2+A; Sinclair et al 2004, 1+A) that interventions provided by all types of health care professional can (cost effectively) enhance quit rates. But brief advice on smoking cessation provided by doctors appears to be more effective than similar advice given by pharmacists and nurses. This could be a function of contextual variables that may be capable of modification.

There is good evidence (Moher et al, 2005, 2+A) that smoking reduction and cessation interventions are as effective when delivered in work places as they are when provided via other settings, and that they could reach a wide range of people.

There is good quality but limited evidence (Park et al 2004, 1+B) that partners can enhance quit rates. Supportive and uncritical relationships between 'live-in' partners are more likely to facilitate quitting than critical home environments.

There is good evidence (Hey and Perera 2005a, 2+B; Hay and Perera 2005b, 2+A) showing that short term incentives to stop smoking are not effective in promoting long term behavioural changes, once the incentive has been removed.

There is good quality evidence (Secker-Walker et al 2002, 2+A) that community interventions that endure for longer periods and achieve higher awareness levels than others are more likely to be effective, regardless of the communication channels used. This source also provides limited evidence that they are more likely to change women's perceptions of community views than those of men, but that the latter are more likely to stop smoking.

S.3.1.5 Health behaviour change in later life

In more affluent and educated communities chronic illnesses are relatively prevalent, Adults in later life may regardless of their health status be more likely than their younger peers to be aware of health hazards and the benefits of avoiding them. Thus interventions to promote health behaviour change may be particularly valued by (and be relatively cost effective in) people at or over the formally defined retirement age. In the context of smoking cessation no studies concentrating specifically on later life were identified via the search and selection process used in this review. However, quitting can reduce the risk of a myocardial infarction by 50 per cent in two years.

S.3.1.5.1 Dietary interventions

In this field Fletcher and Rake (1998, 2+B) reported large effect sizes in trials where selected populations of older people at very high risk of malnutrition were supplied with special meals services in their own homes or in day centre or other institutional settings. These authors found weaker evidence of benefit derived from other nutritional interventions amongst other older people living in communal settings or in the community. However, one study analysed showed a large (> 50 per cent) increase in the sale of wholegrain bread to older persons following a targeted social marketing campaign. In commenting on nutrition in later life, Contento et al (1995, 3-B) highlighted the importance of individual and group interventions aimed at facilitating behavioural changes via techniques such as goal setting.

Evidence statement

Programmes that provide nutritionally appropriate meals to older people at high risk of malnutrition have large effect sizes. There is weak evidence (Fletcher and Rake 1998, 2+B) of effect for other interventions providing dietary advice and allied support to older populations, although 'social marketing' approaches to issues such as promoting whole grain bread consumption can be effective.

S.3.1.5.2 Physical activity

Cyarto et al (2004, **2-A**) found evidence of immediate positive effects of interventions made in this context. Tailored interventions maintained over extended periods of time are most likely to have relatively large effect sizes. Ashworth et al (2005, **1++B**) reported that although in the short term centre based programmes may display greater success than home based programmes, the latter are more likely to be effective maintaining increased activity levels in the longer term. Given the importance of effect duration in relation to health risk reduction, this is an important observation. Individuals with special needs may need special, relatively intensive, services, which could well be cost effective in their particular circumstances. Yet the wider population of older people who would benefit from increased physical activity are likely to be better served by programmes aimed at facilitating more active normal daily lives. Findings reported by Dishman and Buckworth (1996, **2-B**) also support this conclusion.

Evidence statements

There is good quality evidence (Ashworth et al 2005, 1++B; Dishman and Buckworth (1996, 2-B) that although in the short term centre based programmes for promoting physical activity are often more successful than home based programmes, the latter are more likely to be effective in maintaining increased activity levels in the longer term.

Providing special centre based programmes to individuals with special needs can be cost effective. But these sources indicate that the wider population of older people who would benefit from increased physical activity can be better served by programmes aimed at facilitating more active normal daily lives.

S.3.2 Gender and health behaviour change

Krummel et al (2001, **2-B**) reviewed 51 studies relating to the prevention of cardiovascular disease in women via changing smoking, diet and activity related behaviours. They noted in the context of smoking that some components of women's attitudes may be more inclined to change in response to community interventions than men. But this may not make them more likely to quit (Secker-Walker et al 2002, **2+A**). Social support and networks seem to be more important to female as opposed to male well-being. It is uncertain whether such differences reflect socialised characteristics, or more inherent sex-linked variations.

Krummel et al concluded that behavioural strategies utilising techniques such as self-monitoring and feedback can increase exercise rates, and that women respond better to lifestyle related physical activity interventions than structured exercise programmes. This is consistent with other evidence sources. (See, for instance, Fletcher and Rake 1998, **2+B.**) Women from many cultures seem more inclined than men to assume that physical activity is embedded in their family care and home roles, and that it is wasteful of time and effort for them to seek additional sports/leisure based physical activity. But attitudes like this could on occasions serve to hide asymmetries between male and female power relationships within ethnic and other social groups.

With regard to diet, Krummel et al commented that few relevant interventions have been tailored specifically for women. But there is evidence that both younger and older women tend to respond more to dietary information than males, in terms of both the knowledge they gain and the action they take. (See, for example, Brunner et al 2005, **1++A**; Shepherd et al 2001, **3+A.**)

Evidence statements

There is evidence (Krummel et al 2001, 2-B; Brunner et al 2005, 1++A; Shepherd et al 2001, 3+A) that women are more likely than men to respond positively to health behaviour change interventions aimed at promoting healthy eating and restricting weight gain. At the same time they may be less likely to respond positively to exercise promotion interventions, other than those aimed at increasing physical activity in the context of normal daily living.

In the context of smoking cessation there is good quality although limited evidence (Secker-Walker et al 2002, 2+A) that women's attitudes may change more than those of men in response to community interventions. But this does make them more likely to quit.

S.3.3 Income, social position and health

Differences in income and social position are strongly related to health status variations (Drever and Whitehead 1997; The Acheson Report 1998; Graham 2000). There is in Britain today a clear association between relative social disadvantage and behaviours like smoking and 'junk food' consumption. Yet it should not be assumed that these relationships are directly causally linked. In the context of smoking, for

example, lung cancer rates in Spain (where the smoking pandemic is less advanced than it is in Britain) are still higher in better off as opposed to less advantaged men and women (Mackenbach et al 2004). This has a number of important implications for public health improvement.

The Contributors to the Cochrane Collaboration and the Campbell Collaboration (2000, **2+A**) highlighted the importance of structural change programmes, such as those aimed at increasing the cost of smoking. They quoted research indicating that interventions aimed at enhancing knowledge and choice are more likely to benefit advantaged groups than those whose health behaviours are determined more immediately by environment pressures (Gepkens and Gunning-Schepers 1996, **2-A**). However, the historical, social, psychological and biomedical factors underlying health inequalities are complex, and there may be hazards associated with exaggerating the differences between people in different socio-economic groups.

Kaper et al (2005, **1++C**) systematically reviewed the impact of alternative approaches to health care funding on interventions to enhance quit rates. Their conclusion was that full funding of smoking cessation interventions (that is, funding that from a consumer perspective makes such services free at the point of demand) is at a population level more effective in reducing smoking rates than partial funding (involving co-payments) or no funding other than via consumer out of pocket payments. This suggests that in the case of preventive interventions the availability of adequate public funding is likely to be a critical success determinant, especially in relation to reducing health inequalities associated with socio-economic positioning.

Taylor et al (1998, **2-D**) systematically reviewed 14 US studies with the intention of assessing the effectiveness of interventions to promote increased physical activity rates in low-income groups, ethnic minorities and people with disabilities. Programmes addressing the needs of people with physical disabilities were found to be effective in facilitating enhanced activity rates. But these authors identified no studies concerning physical exercise promotion in low income groups, other than research into the effectiveness of interventions aimed at ethnic, and particularly Afro-American, populations.

Evidence statements

There is evidence (Gepkens and Gunning-Schepers 1996, 2-A; Contributors to the Cochrane Collaboration and the Campbell Collaboration 2000, 2+A) that structural interventions that affect the health behaviours of entire populations are more likely to reduce health inequalities than interventions focused primarily on increasing knowledge and facilitating informed choice.

There is good evidence (Kaper et al 2005, 1++C) in the context of smoking cessation that fully funded preventive interventions are, particularly if they are to reduce health inequalities, more likely to be effective than partly or consumer payment funded interventions.

S.3.4 Ethnicity and health behaviour change

There is a risk that analyses based on ‘untheorised ethnicity’ will (like naïve approaches to the health inequalities associated with socio-economic positioning) over-state the inherent differences between people with different cultural backgrounds and/or varying genetic endowments. The general salience of material factors like income, housing, access to education and employment should not be ignored.

With regard to diet and ethnicity, White et al (1998, 2+A) pointed to a dearth of relevant studies in the UK. But these authors suggest that ‘culturally tailored’ one to one, small group and adult class based interventions can be effective in changing the eating patterns of people from ethnic minorities. This is consistent with the findings of Ammerman et al (2001, 1+B) in relation to total and saturated fat intake, and the recommendations of the Contributors to the Cochrane Collaboration and the Campbell Collaboration (2000, 2+A). Lawrence et al (2003, 2-C) also found evidence of positive effect being gained via ethnically tailored programmes. Stead et al (2003, 1-B), in a review of evidence on telephone counselling for smoking cessation, noted that (in combination with targeted advertising) services utilising this communication channel might provide a cost effective way of supporting minority populations.

Evidence statements

There is a lack of robust research evidence on the extent to which ethnic minorities can benefit from culturally specific health behaviour change interventions. However, White et al (1998, 2+A) and Lawrence et al (2003, 2-C) found limited evidence that appropriately tailored interventions can have enhanced effectiveness in changing the eating and smoking patterns of people from ethnic minorities.

There is limited evidence (Stead et al 2003, 1-B) supporting the view that targeted telephone based services may be of value in aiding smoking cessation, especially in contexts where personal contact opportunities are limited.

S.3.5 Place and health behaviours

Place, in terms of geographical location, the dynamics of neighbourhood and the ways in which the social history and linked physical characteristics of areas of residence may have a significant influence on health and health behaviour – see, for example, Gatrell et al 2000. However, none of the studies identified for the purposes of this tertiary review were aimed specifically at elucidating the influence of place on the effectiveness of health behaviour change interventions. Although locational context is a potentially important variable to take into account when evaluating health behaviour change programmes, its components do not appear as yet to have been systematically identified and quantified.

S.3.6 Other context related influences on the effectiveness of interventions to promote behavioural change

For the purposes of this study five further sets of context related findings have been identified.

- A. The effects of smoking cessation (and other) interventions in people with complaints such as circulatory disorders may, at least in some circumstances, be greater than that of similar interventions in the general population. Van Berkel et al (1999, 2-A) found evidence that smoking cessation rates amongst adults with coronary heart disease are normally more effective than similar interventions amongst the general population. These researchers concluded that people recovering from myocardial infarctions, which can be seen as initial warnings of serious illness, are most likely to respond positively to relevant behaviour change interventions. By contrast, patients recovering from planned surgical interventions for heart and related disorders may believe themselves to ‘cured’, and therefore be less likely to respond positively.

- B. DeHaven et al (2004, **2-B**) found that faith related organisations can provide settings for the effective delivery of health programmes. The great majority of the studies identified by these authors involved African Americans.
- C. Computer and internet based interventions may be able to offer new low cost ways of reaching selected populations, and providing them with information, peer group support and professional advice (Bessell et al 2002, **1-B**). Wantland et al (2004, **2+B**) conducted a meta-analysis of the effects of web-based interventions aimed at ends such as weight loss, exercise promotion and dietary change. Small to moderate positive effects were recorded in a range of knowledge improvement and behavioural change dimensions. A reduced number of cardio-vascular events was claimed in one study.
- D. Tailoring HBC interventions can in some contexts enhance their efficacy (Ryan and Lauver 2002, **2-A**). These last authors found interventional tailoring to have increased effect when it facilitates ipsative feedback, allowing individuals comparative information about their past and present behaviours.
- E. Mass media coverage provides in modern societies an intellectual environment that can locate individuals and groups within a wider national and international framework, and guide their interpretation of information and events. Many of the reviews discussed in this analysis acknowledged the power of such media based communications to influence the outcomes of health behaviour change interventions at a population level. However, few presented any evidence relating to the scale of the effects achievable via mass media based interventions alone, or as adjuvants to personal and group interventions. This may in part reflect the difficulties inherent in separating the latter from the impact of secular trends. It could also reflect limitations in the agendas and expertise of not only health behaviour change and health promotion researchers in the US and elsewhere, but also the agencies responsible for commissioning their work.

Evidence statements

There is limited evidence (van Berkel et al 1999, 2-A) that groups provided with information and support at timely points in the development of given types of illness, such as shortly after a first myocardial infarction, may be more motivated to change their behaviours than other populations.

There is relatively weak evidence (DeHaven et al 2004, 2-B) that faith based interventional settings may facilitate effective communication with groups less easily reachable via other routes.

There is limited quality evidence (Bessell et al 2002, 1-B; Wantland et al 2004, 2+B) that targeted internet based services can provide a cost effective means of supporting health behaviour change amongst those sections of the population able and motivated to use this channel

There is limited quality evidence (Ryan and Lauver 2002, 2-A) that tailored interventions that allow ipsative feedback can be more effective than standard interventions in some contexts.

S.4 DISCUSSION AND CONCLUSIONS

A further summary overview of the evidence analysed in this tertiary review is provided at the start of Section 4 of the main report. The research question addressed by this review is *'How does the social and cultural context in which people live influence the effectiveness of interventions to change (health) knowledge, intentions and behaviour?'*. Yet the evidence summarised in above has only a limited capacity directly to provide answers relevant to this inquiry. Further, one of the main conclusions that can be drawn from the information gathered is that outside the area of smoking prevention and cessation support in adults it is not at this stage possible to state robustly which broad types of (and targets for) health behaviour change intervention are likely to be most (cost) effective. Similarly, the evidence gathered during this study indicates that it would be wrong to assume that differences in gender, ethnicity and class are consistent markers of different levels of responsiveness to health behaviour change interventions.

There are many potentially important opportunities to support exercise and dietary changes across all life stages, and in a wide range of social contexts. But given the presently available biomedical and health promotion science evidence base, considerable caution should be taken in offering generalisations about what options

are most desirable and/or viable. Within any specific area some interventions may offer significant health gain and good value for money, while others will not. This situation is further complicated by the fact that some of the most important impacts of HBC interventions may relate to their capacity to influence secular trends, rather than their more immediately measurable impacts on individuals and groups.

Given this, the quality of individual project planning and delivery may, for present planning and funding decision purposes, often be taken to be the most significant differentiator between successful and less successful interventions. Much recent debate about public health policy and the reduction of health inequalities has concentrated on the merits of promoting informed individual choice, as against those of interventions which have a structural impact. That is, interventions that affect the entire community, regardless of variations in personal volition. Such environmental changes are most likely to be of particular benefit to people living in circumstances that are unsupportive of voluntary behavioural change. They are also likely to be more cost effective than those which require extensive programmes of persuasion and support (Wanless 2004).

However, it can be argued that in today's social conditions a pragmatic balance is required between structural intervention – when this is both beneficial and politically viable – and the effective support of informed health behaviour choice (Blair 2006). The latter may be especially relevant in circumstances where a majority of the public is uncertain of the benefits of preventing health harming behaviours. Individually oriented progress towards the more general adoption of healthier options could in such social and political contexts eventually open the way to structural protection. The banning of smoking in public places illustrates this point.

The effectiveness of health behaviour interventions is not simply a function of their capacity to influence individual cognitive processes. Their impact is in large part shaped by wider social processes, and the physical environments in which people live and exercise choice. The analysis provided by this review highlights the importance of variables such as the perceived credibility of health promotion messages (and messengers) amongst groups and communities, as well as the strength of the

biomedical evidence available on the mechanisms involved in generating specific forms of health gain.

The (cost) effectiveness of health behaviour change interventions depends critically on the scale of the individual and population level health benefits to be derived from the actions being encouraged, rather than on the sizes of intermediate effects. But it can nevertheless generally be said that more effective interventions are not aimed at simply providing information and increasing salient knowledge levels. Rather, they more directly support behavioural change through measures such as enhancing motivation and removing environmental barriers to action. Examples of the latter range from goal setting (Ammerman et al 2001, **1+B**; Ammerman et al 2002, **2+B**) and employing CBT based techniques in, for example, the context of adolescent smoking cessation (McDonald et al 2003, **2-B**) through to increasing convenient access to healthy foods in environments like schools (Shepherd et al 2001, **3+A**). Evidence showing that exercise levels in later life are more likely to be enhanced and maintained as a result of home based interventions also serves to highlight the relevance of convenience (alongside factors such as enjoyability and affordability) as a determinant of day-to-day behaviour (Ashworth et al 2005, **1++B**).

The narrative as well as empirical evidence contained in the studies included in this tertiary review also indicates that the frequency, source plurality, goal specificity and duration of health message delivery also helps to determine interventional effectiveness. Programmes that last for longer periods and have high awareness ratings and clear, interesting and credible messages are likely to be more effective than brief, less widely noticeable interventions with unclear ends and messages. The extent to which interventions are mediated via the use of factors such as, for instance, media coverage, written materials, internet communications and third party comment additionally influences their (cost) effectiveness. Although there are exceptions, 'value for money' is likely to be limited in the case of interventions that rely only on face-to-face interactions.

The channels by which messages are delivered and the settings in which they are received can also affect interventional effectiveness, as may the status of the individuals involved in the communication process. But the size of these effects

seems on the basis of the evidence reviewed here often to be relatively small. Media channel and professional group linked effect size variations may be primarily dependent on audience perceptions of appropriateness. These factors might themselves be amenable to change.

Cultural preferences, community values and social capital linked influences (ranging from varying levels of trust in 'official' health messages to, for example, the availability of safe areas for sport and the extent to which smoking is locally accepted as desirable and normal) exercise a further influence on the effectiveness of health behaviour change interventions. Against this, there is evidence that targeting and tailoring interventions to meet the needs, expectations and cultural requirements of particular groups can to a degree offset the negative impacts of such contextual variables. (See, for instance, White et al 1998, **2+A**; Ryan and Lauver 2002, **2-A**.)

It might be argued that attempts should be made to combine data on the impacts of factors like those noted above in a summary format, in order to provide a rapid guide as to which HBC interventions can most confidently be expected to be (cost) effective. However, if such an approach were in future to be adopted care should be taken to ensure that any such evaluative instrument is not applied in an unduly simplistic manner by public health service commissioners. Each case ought to be considered on its merits, against the background of a broad understanding of the contextual and other considerations likely to impinge on HBC interventional effectiveness.

S.4.1 Conclusion: commissioning more relevant research

Variations in what can perhaps be best described as health related behavioural fashion clearly exist. Growing awareness of this fact may in future lead to a greater emphasis on the use of 'social marketing' techniques to attain public health goals (Adshead 2006, Mayo 2006 – this will be the subject of another NICE CPHE commissioned review). Other issues raised by the direct and deductive findings of this study relate to the differing needs of children and adolescents as opposed to working age and older adults; the role of medicines as instruments of public health improvement, alongside

more conventional HBC programme components; and the value of psychological theory in HBC interventional design and delivery.

However, it is most relevant to conclude here by re-emphasising the point that many of the authors of reviews included in this tertiary analysis have complained of interventional and effect measurement heterogeneity, and that the effects reported frequently cannot satisfactorily be linked to either health outcomes (Ketola et al 2000, **1-B**) or interventional costs. This largely precludes the meaningful application of techniques such as meta-analytical (or even systematic) review, and cost effectiveness analysis. The current body of (English language) research on the effectiveness of HBC interventions might in overview be described as a disparate literature, relating primarily to US experience.

There is thus a need for a more coherent, adequately funded, public health research commissioning approach in England (and/or the UK and the EU more widely) which seeks to build constructively on work aimed primarily at summarising existing knowledge. This should in future facilitate the conduct of original, well planned, primary studies of sufficient size to provide 'new knowledge' based answers to high priority, generally significant, public health questions. The authors of this review of reviews hope that it will help contribute to the identification of relevant questions for such studies, and the further creation of a culture that is unequivocally focused on excellence in the context of improving the public's health in the most affordable and socially acceptable ways available.

1. BACKGROUND

The National Institute for Health and Clinical Excellence (NICE) has been asked by the Department of Health to develop guidance on *'the most appropriate means of generic and specific intervention to support attitude and behaviour change at population and community levels'*. This review, undertaken by The School of Pharmacy, University of London, was, with five others, commissioned by NICE to support the preparation of its response to this request.

Behaviour change has often been conceptualised in social science based investigations related to the promotion of better health in essentially individual terms, even when the goal of such work has been to contribute to community and population level health improvement. But there is today increasing understanding of the influence that broader social and economic factors have on the operation of individual and family choice, and hence macro level public health outcomes. This review sought to identify and evaluate evidence relating to how the social and cultural context in which people live influences the effectiveness of interventions to change health knowledge, attitudes, intentions and behaviours.

1.1 The public's health gains in the twentieth century

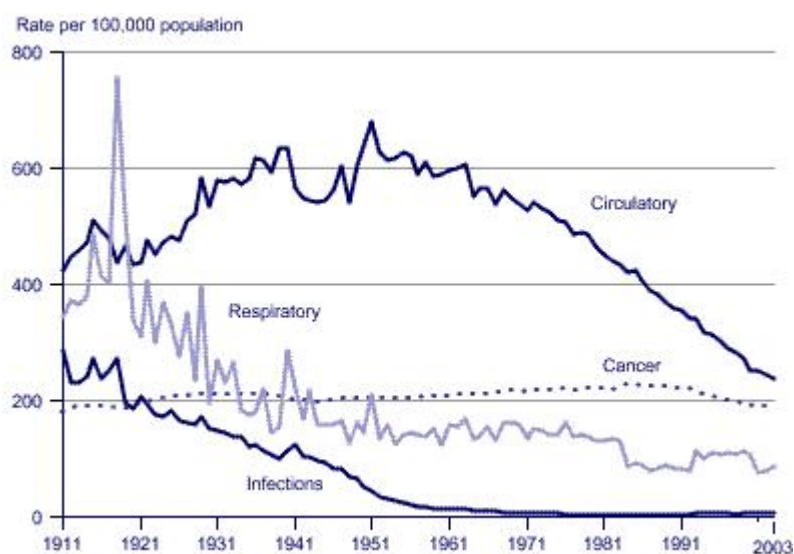
The average life expectancy for men and women living in England rose from about 50 years in 1900 to about 75 years for men and 80 for women in 2000. These gains were in large part due to decreases in infant mortality. In 1899 B. Seebohm Rowntree found, in a pioneering study of the population of York, that amongst the poorest section of the community approximately 250 per 1,000 live born infants died in their first year of life (Rowntree 1901). Amongst the better-off the mortality rate found by Rowntree was 100 per 1,000. Today's national average is 5 per 1,000. Even the most disadvantaged groups in what is now a much more diverse British population are unlikely to experience infant mortality rates of over 10 per 1,000.

Improvements in public health have thus benefited the whole of society. In ratio based terms the scale of health inequalities between social groups in this country (as defined, for example, via NS-SEC, the National Statistics Socio-Economic

Classification, and the previously used Registrar General system based on occupation) appears to have widened in recent decades, in respect to both mortality and morbidity. (See, for instance, Drever and Whitehead,1997, and *The Acheson Report*, 1998.) Yet at the same time the proportion of the population living in the more disadvantaged groups has fallen significantly, and in areas such as infant and child mortality absolute differences in death rates have narrowed dramatically.

In relation to the health of adults the 60 per cent decline in age standardised circulatory disease (stroke and coronary heart disease) death rates seen in England and Wales since the start of the 1950s has also been associated with significant benefits for all sections of the community (Figure 1). Across the whole population, people in less advantaged social positions have in absolute terms tended to gain even more from such mortality reductions than men and women in more affluent and better-educated groups (Oliver et al 2002).

Figure 1 Age standardised mortality rate for selected broad disease groups, 1911-2003, England and Wales



Source: National Statistics

Average life expectancies have increased in this country throughout the last hundred years, in part because of recent increases in the effectiveness of medical interventions for ‘rescuing’ older individuals exposed to acute life threatening events such as myocardial infarctions (Bunker 2001). At the same time the prevalence and social

impact of chronic illness has also risen, and along with it awareness of the importance of preventing disability and social handicap wherever possible.

Arguably, the central goal of twenty first century (public) health strategies should be not only to minimise the incidence of physical and mental illness amongst people below the traditional retirement age, but also to extend good health well into life after the age once regarded as marking an end to productive participation in society (Mechanic 1995, Taylor and Bury 2006). In modern, affluent and democratic societies this will of course require voluntary effort on the part of individuals to avoid or reduce health risks. Yet those most at risk of premature death or disability are in relative terms most likely to benefit from structural interventions which, like speed limits and obligatory seat belt wearing, serve to reduce the level of collectively experienced hazard (Gepkins and Gunning-Schepers 1996, 2-A). Although individual behavioural decisions and habits are unquestionably relevant to health, the social environments in which they are embedded are likely to be even more important determinants of health inequalities between groups (Blaxter 1990, Marmot 2006).

These trends and opportunities underlie the conclusions of the second Wanless report, *Securing Good Health for the Whole Population* (Wanless 2004). This called for greater public engagement in health improvement, as did the White Paper *Choosing Health: Making Healthy Choices Easier* (Cmnd 6374, 2004). Such demographic and epidemiological developments are also linked to the findings of broader studies on the importance of health improvement to the future economic development and well-being of the people of the European Union and its member States (Suhrcke et al 2005). Unless older, 'post-transitional', populations like that of this country can maintain the positive health and productivity of their members into later life, they may well become unable to afford the public and other services currently available. Such concerns in turn underpin current political interest in efficiently promoting health protecting and enhancing behaviours (Blair 2006).

1.2 The biological and epidemiological impacts of health behaviour changes

Additional background issues relating to the economics and social determinants of public health are considered in Appendix 1 on page 116. They relate to smoking

behaviour, gender and health, ethnicity and health, and the concepts of social class and social capital applied in the health context. In relation to the latter, a recent comparison by Banks et al (2006) of disease and disadvantage amongst middle aged people in the United States and England found the US population at every level of socio-economic status to be unhealthier than that of England. For example, type 2 diabetes rates are twice as high in America than in England. Adjustment for rates of smoking, overweight and other risk indicators (excepting physical activity levels, for which appropriate comparative data was not found) explained only 20 per cent of the observed variance. The authors discuss issues such as the steeper gradient in socio-economic status that exists in the US as opposed to the UK. Their analysis highlights the public health (as distinct from direct biomedical) value to the British population of the NHS, and of welfare provisions that reinforce awareness of social solidarity and the availability of collective support in times of sickness and personal vulnerability.

However, for the immediate purposes of this review the most important introductory points to emphasise here relate to the extent to which changes in health behaviours such as, say, eating more fruit or less saturated fat at various points in an individual's life course will in reality serve to extend life expectancy or decrease morbidity. The reason why it is relatively easy to identify the cost effectiveness of interventions aimed at smoking prevention and cessation is because the effects of tobacco use on health have been robustly delineated. Also, giving up smoking is a relatively simple form of behaviour change. The effects of relevant interventions can therefore be expressed in what are from a public health perspective are meaningful dimensions, such as premature deaths avoided or years of disability saved. This (notwithstanding disputes as to the validity of utility measures such as Quality Adjusted Life Years in relation to improved public health – see Appendix 1) allows the value realised for the money invested to be calculated in ways that are useful to high level policy makers.

But in fields like exercise promotion and diet there is more uncertainty about the extent to which changes in behaviour will endure, and in time lead to desired health gains. For instance, in relation to eating increased amounts of fruit and vegetables there are no robust controlled intervention studies of the latter's effects; hence the size and nature of any significant contribution to population health remains uncertain (Contributors to the Cochrane Collaboration and the Campbell Collaboration 2000,

2+A – for review grading schema see next Section). Reported associations in this and many other fields might even be misleading artefacts, perhaps due to cross correlations with factors such as socio-economic class and/or as yet unidentified biological variations linked to differences in status and power relationships between groups that can influence an individual's sense of control over her or his life.

Inabilities to link behavioural changes to desired health outcomes lead many researchers to express their results in ways that cannot be used to quantify and compare the value of public health interventions with other forms of health investment. Ketola et al (2000, **1-B**) highlighted this problem in a systematic review of lifestyle interventions aimed at reducing cardiovascular disease risks in people of working age. They noted that primary prevention programmes amongst healthy people typically produce small biological effects, unlikely to be judged important by clinicians. Secondary interventions in people with diagnosed CVD typically produce larger biological effects sizes, although that does not necessarily mean that they are in overall terms more (cost) effective in public health terms. (Small changes across large populations can be more significant than larger effects confined to much smaller populations.)

Yet having noted the above, recent research conducted in the UK has reinforced the body of observational evidence linking relatively modest changes in physical activity and diet to significant differences in longevity and disability free life expectancy (Khaw et al 2001, 2006). During the 1990s Khaw and her colleagues recorded the relationship between vitamin C levels and death rates in a population of some 20,000 middle aged and older men and women living in East Anglia. Relatively small increases in fruit and vegetable consumption (equivalent to one circa 50 gm serving a day) were associated with a 20 per cent reduction in all cause mortality rates. In a subsequent study, these investigators also examined the relationship between physical activity and observed mortality rates. They concluded that even moderate levels of activity (0.5 hrs of recreational activity a day for people with a sedentary, sitting, job) are associated with a significantly (circa 10 to 20 per cent) reduced risk of both all cause mortality and cardiovascular disease incidence.

Such observational (as distinct from intervention derived) findings are broadly consistent with a number of other study conclusions. For instance, a recent Cochrane Review on the impact of dietary advice (Brunner et al 2005, 1++A) found that many health promotion programmes successfully increase fruit and vegetable consumption in adults by about one serving a day. These researchers calculated, on the basis of recorded cholesterol and blood pressure reductions, that such modest life style adjustments can realistically be expected (assuming that they are maintained) to cut stroke and coronary heart disease incidence rates by some 10 per cent.

The view taken here is therefore that the conclusions drawn by Khaw and her colleagues as to the potential scale of the benefits likely to be generated by relatively modest population level changes in diet and exercise patterns are plausible. A further consideration to take into account regarding this last area and the incidence of metabolic syndrome and type 2 diabetes is that reasonable, evidence based, biological explanations as to why increased levels of exercise may help prevent the emergence of problems such as insulin resistance are now emerging (Alberti 2006). In line with the Bradford-Hill criteria for establishing causal relationships between epidemiological observations, such advances should be seen as providing evidence supportive of public health based approaches to CVD and diabetes prevention.

1.3 Review Aims and Structure

Within the policy environment described in documents like the White Paper *Choosing Health: Making Healthier Choices Easier* (DoH 2004) and the Prime Minister's more recent statements on healthy living and shared public and private responsibilities to promote better health (Blair 2006), the aim of this review (commissioned by NICE from the School of Pharmacy, University of London) is as previously noted to examine the impact of contextual issues on the effectiveness of health behaviour change (HBC) interventions. The research question that the School of Pharmacy team was asked by NICE to address was: '*How does the social and cultural context in which people live influence the effectiveness of interventions to change (health) knowledge, intentions and behaviour?*'

In answering this question the research team was requested to use examples from the fields of smoking, physical activity and healthy eating, and specifically to consider the relevance of:

- *life course;*
- *gender;*
- *income and allied social positioning;*
- *ethnicity;*
- *place; and*
- *other variables highlighted by the literature.*

With regard to ‘other’ contextual variables the search undertaken generated findings in fields such as the provision of health support in workplaces. It also highlighted issues such as the influence of professional status on the effectiveness of interventions to change health knowledge and behaviour. The methodology employed is described in Section 2 of this document (page 47). This Review’s findings are presented in Section 3 (page 54), beginning with information and data on variations in the effectiveness of health behaviour change interventions at different life course stages. Sub-sections on gender, income and socio-economic positioning, ethnicity, place and other contextual variables not already addressed under the previous headings follow.

The conclusions and recommendations of this study are presented in Section 4. The authors were also asked to consider relevant information on the cost effectiveness of health behaviour changes. As already noted, some brief observations relating to this area are presented in Appendix 1. But as a final note of introduction it is relevant here to acknowledge that human experiences and relationships are likely to be far more complex than the psychological, sociological and economic models used by academic and other researchers to describe and predict individual and group behaviours in health or other contexts (Blaxter 2004). Accepting this, and respecting the need that people have to retain what they experience as adequate levels of control over their lives (even on occasions at the expense of seeming fatalistically to accept negative outcomes that experts may have good reason to see as avoidable) may help those seeking to promote better public health to avoid accidentally causing harm while applying their prescriptions.

2. METHODOLOGY

This review was conducted using methods set out by the NICE Public Health Guidance Methods Manual (National Institute for Health and Clinical Excellence 2006) and in collaboration with the Centre for Public Health Excellence (CPHE) technical team at the National Institute for Health and Clinical Excellence (NICE). The Methods Manual includes guidance about data extraction and quality assessment.

Because of the breadth of literature and the resource limitations set by the review's commissioners a decision was made to carry out a 'tertiary' level review, or 'review-of-reviews', in order to provide the most comprehensive analysis possible in the circumstances. It was judged impractical to attempt to review comprehensively the primary literature relating to such a large area, and inappropriate to do so selectively. The sophistication and extent of the analysis undertaken was inevitably limited by not only the resources immediately available to the School of Pharmacy team, but also by the strengths and weaknesses of the evidence base being explored. The benefits and drawbacks of carrying out a review of reviews have been previously summarised by the Health Development Agency (HDA). An amended Critical Appraisal Tool (CAT: see Appendix 2), based on the instrument developed for this purpose by the Health Development Agency was used, following guidance from the CPHE team.

2.1 Literature search

The electronic database search strategy used for this review was developed in conjunction with information specialists at NICE. Members of the Department of Practice and Policy at The School of Pharmacy, University of London, implemented the search strategy, with the support of NICE colleagues. Full details of the search terms used can be found in Appendix 3. A filter to limit the search to review level literature was applied.

The following databases were searched for published English language literature from 1995 onwards:

- MEDLINE
- EMBASE

- PsycInfo
- Sociological Abstracts
- ASSIA
- ERIC
- CINAHL
- The King's Fund Database
- Cochrane Database of Systematic Reviews

Search results were downloaded into Reference Manager and duplicates deleted. In addition to the searches above, reference lists of review articles were hand-checked and studies were included where they met the inclusion criteria. Relevant articles known by the review team and others found on an *ad hoc* basis were also included.

2.2 Selection of studies for inclusion

The inclusion criteria presented below were based on the requirements set out in the scoping document produced by the National Institute for Health and Clinical Excellence (NICE 2005).

Inclusion criteria:

- reviews published in English; and
- reviews reporting empirical data on the effectiveness of interventions designed to change knowledge, attitude, intention and behaviour with respect to smoking, physical activity, and health eating, and with specific attention focussed on whether or not effectiveness is influenced by the position in the life course, mode of delivery or social and cultural context.

Exclusion criteria:

- no co-morbid conditions (unless recently diagnosed e.g. behaviour change after myocardial infarction);
- no substance abuse;
- no mental illness;
- no interventions in secondary care

- not solely a clinical or pharmacological method (but included if in combination with other interventions);
- no screening programmes.

Meta-analytic and systematic reviews were included in the dataset. When appraised, reviews selected for inclusion in the dataset for this review were graded for quality and type according to the hierarchy of evidence set out in Table 4.1 of the NICE Public Health Guidance Manual. These are adapted from the Scottish Intercollegiate Guidelines Network (2002) - see Table 2.1 below.

Table 2.1 Levels of Evidence

Level of evidence	Type of evidence
1	Meta-analyses or systematic reviews of RCTs
2	Meta-analyses or systematic reviews of non-randomised controlled trials, case-control studies, cohort studies, controlled before-and-after (CBA), interrupted time series (ITS), correlation studies
3	Non-analytic studies (for example, case reports, case series)
4	Expert opinion, formal consensus

2.3 Quality appraisal

The search strategy generated 4650 potential citations. Titles and abstracts were screened against the inclusion criteria. A random 10 per cent sample was independently double screened and compared to ensure consistency of inclusion. A total of 192 reviews were identified as potentially relevant. These were subsequently independently appraised by two reviewers (using the CAT instrument) for suitability for inclusion in this review, and results were then compared. Any disagreements were resolved by team discussion. For a more detailed list of papers identified, screened and accepted see the flowchart in Appendix 5.

2.4 Study categorisation

For all reviews that met the inclusion criteria, data were extracted onto a form based on the one provided in the CPHE methods manual (see Appendix 6).

The data extracted included:

- type and quality of review;
- type of studies included;
- research questions;
- databases and sources searched;
- inclusion and exclusion criteria;
- number of studies and participants included in the review;
- method of analysis;
- data extracted;
- results and conclusions;
- evidence of effectiveness in subgroups;
- cost effectiveness data, if provided;
- recommendations for practice, policy and future research; and
- strengths and weaknesses of review, including generalisability to UK.

Reviews were classified by quality and design according to the CPHE methods manual. The criteria are set out in Table 2.2 below. Quality assessment was carried out using the CAT (see Appendices B-H of the CPHE Methods Manual, Guideline Development Methods).

Table 2.2 Quality Scores

Criteria	++	+
Was there a focused aim or research question?	Yes	Yes
Explicit inclusion / exclusion criteria	Yes	Yes
More than one assessor / selector	Yes	
Provide details of databases searched	Yes	Yes
Lists years searched	Yes	Yes
Followed up references in bibliographies	Yes	
Experts consulted for further sources		
Grey literature included / searched		
Specified search terms / strategy	Yes	Yes
Not restricted to English language papers only	Yes	
Quality assessed	Yes	Yes
Data supports conclusions	Yes	Yes

Notes:

++ must *at least* meet 10 criterion indicated above

+ must *at least* meet 7 criterion indicated above

o 4 or less criteria

2.5 Assessing UK applicability

Applicability to the UK setting was graded according to the NICE criteria (A-D):

- A. Includes UK studies
- B. Non-UK studies of interventions that would be most likely to equally apply to UK settings
- C. Non-UK studies that may have some application to UK settings but should be interpreted with caution. There may be strong cultural, ethnic, religious, climatic or institutional differences that would have impact on the effectiveness of the intervention if applied in the UK
- D. Non-UK studies that are clearly irrelevant to UK settings

2.6 Synthesis

Detailed information about individual systematic reviews and meta-analytical studies is presented in the evidence tables (Appendix 7). The reference list for these reviews is presented in Appendix 8. Table 2.3 describes the areas covered by the included reviews, including their respective quality scores and UK applicability ratings.

Table 2.3 Categorisation of Included Reviews, including Quality Scores and UK Applicability Ratings

	Physical activity	Diet	Smoking
Economic/income			Kaper et al., 2005 (1++C)
Social class	Gepkens and Gunning-Schepers, 1996 (2-A)		
Culture/ethnicity	Taylor et al., 1998 (2-D)	Ammerman et al., 2001 (1+B) White et al., 1998 (2+A)	Lawrence et al., 2003 (2-C)
Gender		Contento et al., 1995 (3-B)	
		Krummel et al., 2001 (2-B)	
Child/adolescent	Dobbins et al., 2001 (2+A) Brunton et al., 2003 (2+B)	McArthur, 1998 (2+C) Shepherd et al., 2001 (3+A) Stuart et al., 2005 (2+C) Tedstone et al., 1998 (2+A)	Stead and Lancaster, 2005b (2-A) Sowden and Stead, 2003 (2-A) Thomas, 2002 (1+A) Harden et al., 1999 (3+A)

			Christakis et al., 2003 (1-A) McDonald et al., 2003 (2-B)
	Summerbell et al., 2005 (2+A)		
Marriage/divorce			Park et al., 2004 (1+B)
Pregnancy		Kramer and Kakuma, 2003 (1-A) van Teijlingen et al., 1998 (2+A)	Lumley et al, 2004 (2+A) Edwards et al., 2000 (2++B)
Students			Murphy-Hoefer et al., 2005 (2+B)
Elderly	Ashworth et al., 2005 (1++B) Cyarto et al., 2004 (2-A)		
Illness-related stage of life		Ammerman et al., 2002 (2+B)	van Berkel et al., 1999 (2-A)
Individual/community	Dishman and Buckworth, 1996 (2-B)	Roe et al., 1997 (2++A)	Secker-Walker et al., 2002 (2+A)
	Blue and Conrad, 1995 (2-B)	Ciliska et al., 2000 (2++B)	Lancaster and Stead, 2005a (1-A)
	Foster and Hillsdon, 2004 (2-A)	Brunner et al., 2005 (1++A)	Hey and Perera, 2005a (2+B)
	Ogilvie et al., 2004 (2-A)	Fletcher and Rake, 1998 (2+B)	Lancaster and Stead, 2005b (1-A)
		Hider, 2001 (2+B)	Moher et al., 2005 (2+A)
		Hillsdon et al., 1995 (1+B)	Serra et al, 2000 (2+B)
		Morgan, 2005 (2+A)	Stead and Lancaster, 2005a (2-A)
	Engbers et al., 2005 (2++B)		Academic and public health consortium, 2005 (2+A)
		Contributors to the Cochrane collaboration and the Campbell collaboration, 2000 (2+A) Jepson, 2000 (2+B)	Bize et al, 2005 (1+A)
		DeHaven et al., 2004 (2-B) Peersman et al., 1998 (1+B) Ketola et al., 2000 (1-B)	Hajek et al., 2005 (1-A)
		Eysenbach et al., 2004 (2-B)	McBride et al., 2003 (3-B)
Written/telephone/ email/web			Nishi et al., 1998 (1+B)
			Stead et al., 2003 (1-B)
			Hey and Perera, 2005b (2+A)
		Ryan and Lauver, 2002 (2-A) Wantland et al., 2004 (2+B)	
		Bessell, 2002 (1-B)	

Lay/GP/nurse/ Pharmacist interventions	Lawlor and Hanratty, 2001 (2++B)	McLean et al., 2003 (2-B)	Sinclair et al., 2004 (1+A)
	Petrella and Lattanzio, 2002 (2-A)	Thompson et al., 2003 (1++A)	Gorin and Heck, 2004 (2-B) Lancaster and Stead, 2004 (2++A) Rice and Stead, 2004 (2+A) Posavac et al., 1999 (2-B)
			(Blenkinsopp et al., 2003 (2+A))
	Ashenden et al, 1997 (1+A)		

3. FINDINGS

As indicated in Section 1, this tertiary review's findings are presented below first in the context of life stage, from childhood and adolescence through to pregnancy and early parenthood to working age adult and later adult life. There then follow sub-sections relating to gender, income and socio-economic positioning, ethnicity, place and other contextual variables not already addressed under the previous headings.

Definitions such as those of 'child', 'adolescent' or 'young adult' varied considerably between reviews. Some authors defined them with specific age ranges. But even these differed greatly, as from, for example, children aged "to 11 years of age" to children "less than 21 years of age". Other review authors simply described groups as "children", "adolescents", "young adults" or "college/university students" without attempting precisely to define relevant age ranges. This review presents evidence on interventional effectiveness amongst the groups identified in a manner consistent with the approaches used across the range of studies evaluated. Only fourteen (out of a total 77) of the reviews included appropriately calculated effect sizes. These are again reported here in a manner consistent with the original review authors' approaches.

3.1 Life stages

3.1.1 Children

Infants are by definition dependent on their parents, and most often their mothers in particular, for all aspects of their health and well-being. Issues relevant to infant well-being are therefore discussed in section 3.1.3 below. This sub-section focuses on the impacts of health behaviour change interventions have in children aged over one year. These mainly take place via parental support and action, in pre-school and school settings and through wider community interventions.

3.1.1.1 Diet

It is commonly assumed that 'healthy habits' acquired young benefit individuals in later life, both because of their direct developmental benefits and their longer term influence on behaviour. However, in relation to diet there is some uncertainty as to what patterns of food consumption are most beneficial during childhood, and the

extent to which eating patterns acquired then are in reality significant determinants of healthy or unhealthy eating patterns in subsequent life stages (Tedstone et al 1998, **2+A**; Hider 2001, **2+B**). For example, it should not be assumed that reducing fat or total calorific consumption is always beneficial for children. This is important, partly because it means that the cost effectiveness of behaviour change interventions in children in relation to health outcomes is in many respects impossible to calculate.

However, Tedstone et al (1998, **2+A**) concluded from a systematic review of fourteen (principally American) studies of interventions to promote healthy eating that the evidence available indicates that the nutritional knowledge of young children can be increased by preschool inputs, and that involving parents can augment this effect. However, these authors did not find any evidence demonstrating that such increases in knowledge have a significant impact on patterns of food consumption in such children. Nor did they find evidence that research in this area had adequately sought to identify and analyse the experienced needs of parents and preschool children in this field. Other relevant findings from this study included:

- if young children have opportunities experimentally to taste novel foods they are more likely subsequently to accept them than if they are merely shown or told about them;
- giving rewards for consuming items such as 'healthy' drinks may be counter-productive, and reduce the subsequent likelihood of children to accept them;
- knowledge gains from interventions made in the preschool setting tend to be greater than those derived from interventions delivered in home settings; and
- supporting less advantaged mothers can effectively enable them to improve their children's diets and change associated behaviours, such as the frequency of eating meals together at home. (This last conclusion was based on the findings of a study undertaken in inner city Bristol.)

Another study, more specifically focused on the effectiveness of interventions aimed at increasing fruit and vegetable consumption, found (on the basis of US data) that those involving parents of young children can prove effective in increasing the fruit and vegetable intake of the latter, reportedly by between 0.5 and 3 (50 gm) servings a day (Ciliska et al 2000, **2++B**). Ammerman et al, in two related studies (Ammerman et al 2001, **1+B**; Ammerman et al 2002, **2+B**), noted that children are (unlike adults) more likely to increase their fruit as opposed to their vegetable intake, and are also likely to reduce their total fat as opposed to selectively their saturated fat consumption.

Like many of the other analyses included in this review of reviews, these two studies also noted that programmes that involve goal setting, interactive contacts and social support are more likely to have significant outcomes than others. Another extensive review of reviews undertaken by contributors to the Cochrane Collaboration and the Campbell Collaboration (2000, **2+A**) also found that interactive school interventions are more effective at changing behaviour than non-interactive ones.

With regard to (US) school children aged between eight and ten years a meta-analysis (across 12 studies) published in the late 1990s found evidence of a small to moderate positive effect (Cohen's $d = 0.24$) for 'heart healthy' eating (McArthur 1998, **2+C**). Roe et al (1997, **2++A**) also observed that parental involvement is a component of many more effective school interventions to improve diet. They reported fat consumption reductions in the order of 2-4 per cent, and in one instance limited impacts on cholesterol levels, in a 'middle income' family child population. Fat intake in less socially advantaged children may, according to the results of two long term studies included in the Roe review, be less amenable to reduction.

Roe et al also reported uncertainties as to the duration of such effects, and variations associated with gender indicating that girls may be more responsive to diet related interventions than boys. The value of adding home based interventions to those delivered in the school context is, according to these authors' analysis, likely to be very limited. But this might not apply to more intensive support programmes for less advantaged children and their families.

Ciliska et al (2000, 2++B) also found that it is easier to increase fruit as opposed to vegetable consumption in school children, and that interventions can have favourable impacts across the spectrum of knowledge, attitude and dietary behaviour. Shepherd et al (2001, 3+A), in a systematic review of barriers to and facilitators of healthy eating in children and young adults concluded that schools can provide an appropriate environment for the effective promotion of healthy eating, especially among young females. Their findings support 'whole school' contextual approaches, aimed in part at increasing access to 'healthy foods' and teaching skills relevant to preparing foods and also resisting environmental pressures to eat unhealthily.

There is additional limited evidence (relating to a poorer US setting) that the use of internet based interventions can augment the impact of school based initiatives (Bessell et al 2002, 1-B). Consistent multiple component interventions made over long periods of time are more effective than single component and/or short term interventions.

Evidence statements

There is evidence of good quality (Roe et al 1997, 2++A; Tedstone et al 1998, 2+A; Ciliska et al 2000, 2++B; Ammerman et al 2001, 1+B; Ammerman et al 2002, 2+B) that interventions aimed at supporting and involving the parents of children and programmes delivered in schools can significantly increase children's fruit consumption, and have other desired diet related impacts.

There is evidence of good quality (Shepherd et al 2001, 3+A) that shows that sustained 'whole school' approaches to promoting healthy eating are most likely to be effective, particularly among girls.

There is evidence of good quality (Contributors to the Cochrane Collaboration and the Campbell Collaboration 2000, 2+A) that changes in children's knowledge and attitudes towards healthy eating are not consistently linked to their behaviour.

There is evidence of good quality (Tedstone et al 1998, 2+A; Hider 2001, 2+B) that the duration of interventional effects and the quanta of health gain derived from 'healthy eating' in childhood are uncertain.

3.1.1.2 Weight control and obesity prevention

Summerbell et al (2005, 2+A) systematically reviewed ten long term (intervention duration one year plus) and twelve short term (< one year duration) studies of

programmes aimed at preventing obesity in children. The majority were set in schools, and combined exercise and dietary components. Interventions of this type were in the main found to be ineffective in reducing the numbers of overweight individuals, although one study reported a reduction in young female rates. One longer term study using a multi-media approach appeared to be effective in reducing obesity via promoting increased exercise, as to a lesser extent did two shorter term interventions of this type. This analysis again indicated that changes in knowledge and attitude achieved in this context often do not result in behavioural changes sufficient to promote desired health outcomes.

There is evidence across the field of child health promotion that it is relatively easy to enhance knowledge, but more difficult to change attitudes and behaviour (Contributors to the Cochrane Collaboration and the Campbell Collaboration 2000, 2+A). However, this should not necessarily be interpreted as meaning that knowledge changes are not a useful component of health behaviour change. Summerbell et al drew attention to the possible benefits of strategies aimed at promoting supportive environmental changes to complement individually focused HBC programmes. They also discussed the impact of modern work patterns on home environments and family eating patterns. The latter might have greater negative significance among less advantaged communities and families.

McLean et al (2003, 2-B) systematically reviewed literature on family involvement in weight control. Regarding the young they reported that targeting children and adults together can be beneficial for the former, in both the short and long term. They found that the greater the number of weight loss and control techniques taught to parents and children, the greater the likelihood of success.

Evidence statements

There is evidence of good quality (Summerbell et al 2005, 2+A) that programmes for child weight control and obesity prevention are of limited effectiveness, whether delivered in school or other settings.

There is evidence of mixed quality (Summerbell et al 2005, 2+A; McLean et al 2003, 2-B) that programmes aimed at promoting increased physical activity may have more effect than those aimed more broadly at dietary and exercise change. Involving parents and children together can also be beneficial.

3.1.1.3 Physical activity

Two reviews on the effectiveness of school based interventions for the promotion of physical exercise (Dobbins et al 2001, **2+A**; Brunton et al 2003, **2+B**) and the barriers and facilitators of physical activity in childhood were included in this tertiary review. Both offered limited, to a degree conflicting, evidence as to the value of school based interventions. For instance, Dobbins et al found that of three studies providing data on physical activity rates one showed no effect, while two showed modest positive effects on the intervention, as compared to the control, group exercise rates recorded. Regarding impacts on duration of activity, three (of the total of nineteen studies reviewed by these authors) found a positive effect, while a further three did not. In the context of television viewing (which is often assumed to have a negative impact on total physical activity levels) two intervention programmes were found successfully to reduce the time spent watching. Another included study did not report such an effect.

It was concluded that school based exercise interventions are generally ineffective in altering significantly physical indicators of health status. Dobbins et al commented that there is very little high quality evidence showing that children exposed to school based interventions lead more active adult lives as a result, although they also argued that as they *'do not cause harm, and do have some positive effects on activity'* they should continue to be encouraged.

Similarly, Brunton et al (2003, **2+B**) concluded that there is insufficient good quality research available on the effectiveness of interventions to promote childhood physical activity. But they emphasised that children have clear ideas regarding the in part socio-economic and community context related barriers to, and facilitators of, physical activity that they experience. Reported barriers include:

- not enjoying or being good at physical activities that they are expected to take part in;
- lacking the physique required to successfully take part in a sport;
- lacking co-ordination skills;
- frustration with complex rules;
- shame and embarrassment;

- parental and peer group lack of interest;
- financial costs associated with formal sport participation;
- lack of transport, and/or busy/hazardous local traffic conditions;
- lack of pleasant local facilities for physical play and sport; and
- threats and fears of crime and intimidation or ridicule by older children.

Facilitators identified by children include:

- activities that are fun and are personally enjoyable;
- belonging to teams;
- activities that permit having a good time with friends and family members;
- a sense of promoting fitness, health and weight control;
- opportunities for forgetting troubles;
- choice of sports involvement;
- parental and family support;
- having a car, garden and/or good local facilities; and
- flexible school facilities that may for example encourage physical activities outside normal hours.

In the studies reporting children's views the methods of analysis used were generally poorly described. Brunton et al argued that, although schools based physical activities may be of some benefit, more attention should be paid to the contextual/structural determinants of children's lives and physical activity patterns. These are likely to be particularly significant in children at high risk of social exclusion.

They also highlighted continuing uncertainties in areas such as the role of family involvement and behavioural habits in determining children's physical activity patterns. The complexity of the latter's determinates may be such that 'what works' in one setting may be ineffective in another apparently quite similar setting.

Evidence statement

There is good quality, but limited, evidence (Dobbins et al 2001, 2+A; Brunton et al 2003, 2+B) that appropriately designed schools based programmes can be effective in increasing physical activity levels. Yet at the same time there is little evidence that they have effects of sufficient size and duration to alter health status in childhood or later life.

3.1.1.4 Smoking prevention in child populations

Given that the great majority of people who do not start smoking by the age of eighteen never smoke, and that the scale of the harm caused by long term tobacco use is large, interventions that reduce the incidence of smoking in children and young adults are in relative terms likely to be cost effective. In the sphere of childhood (as opposed to young adult) smoking three main contextual fields were identified via the search and evidence evaluation process used here. They are smoking prevention via health care provider led interventions; smoking prevention in schools; and smoking prevention via the restriction of tobacco sales to minors.

Christakis et al (2003, 1-A) systematically reviewed four studies on health care provider led interventions aimed at preventing child smoking. Three of these reported negative findings. The other, which evaluated the impact of an intervention carried out in UK primary care/general practice in Oxfordshire showed a small impact, implying an NNT (number needed to treat) equivalent figure of 40-50. It involved children in the target population being sent a letter from their general practitioner outlining the advantages of not smoking, and recommending abstinence. This suggests that the relationship between British family practitioners and their patients can be of significance in the context of child health promotion and the cost effective prevention of smoking. However, further data on factors such as the possibly differential impact of such interventions on children from differing social backgrounds would be needed to permit a full understanding of the importance of this opportunity.

In the schools context, Thomas (2002, 1+A) conducted a large systematic review of programmes intended to prevent smoking. This author found, in line with research in other health behaviour change fields, that the provision of information alone is less effective than interventions that combine information provision with support designed

to facilitate behaviour change. The majority of the 16 studies rated as high quality in this review (out of a total of 76 included) were based on social influences/social learning theory. Eight showed a positive effect on smoking prevalence and seven did not. One indicated that a programme aimed at promoting social competence (in essence, enhanced behavioural and social inclusion related skills) yet that did not contain a specific anti-smoking component was (at least in the short term) associated with reduced smoking rates in boys, but not girls.

This finding has interesting implications regarding the extent to which enabling some groups to 'fit in' better could increase their members' receptiveness to 'mainstream' health messages. But Thomas concluded that as yet there is insufficient evidence as to whether or not generic social competence training should be used to complement (or as an alternative to) more directly targeted social influence interventions.

Likewise, little evidence was found on the extent to which schools based smoking prevention programmes augment the impacts of wider, multi-modal, community and other anti-smoking initiatives. Thomas noted the findings of a meta-analysis indicating that schools programmes aimed at children aged around eleven might typically reduce relative smoking rates by about 5 per cent: if an optimal range of additional components were added, this might in theory increase the relative reduction in smoking to between 19 and 29 per cent. Yet the conclusions Thomas himself offers are less optimistic. Despite a lack of adequate financial data, this author also questions the cost effectiveness of schools based smoking prevention programmes.

Finally, Stead and Lancaster (2005a, **2-A**) systematically reviewed studies on the prevention of cigarette sales to minors. They found that giving information to retailers is not effective, and that interventions aimed at educating the latter need to be backed by other measures such as community support and enforcement checks. The evidence indicates that behavioural checks are required at least four to six times a year, and suggests that in order to reduce smoking rates in a population of young people retailer compliance with regulations on not selling tobacco to minors must reach a threshold level of over 80 per cent in a given community. But Stead and Lancaster warn against naïve interpretations of such findings. They point out fears that at least in some social contexts strategies based on restricting young people's legal and physical access to

cigarettes could in practice be counter-productive. Factors relating to this may include reinforcement of the idea that smoking confers adult (and/or sexually mature) status.

Evidence statements

There is evidence of good quality (Thomas 2002, 1+A) that programmes on smoking prevention delivered in schools can have a limited impact on rates of smoking in children.

There is evidence of weaker quality (Stead and Lancaster 2005a, 2-A) that restrictions on children's access to tobacco may augment such effects, providing that high rates of compliance are achieved throughout localities. However, the overall impact of such interventions is uncertain.

There is very little evidence of health care provider led initiatives having an impact on child smoking rates, although in England GP communications may have a limited effect (Christakis et al 2003, 1-A).

3.1.1.5 Summary: Contextual influences on the effectiveness of health behaviour change interventions in children.

Most of the reviews reported in this sub-section noted the limited quality of the research undertaken in this field. Commonly encountered problems include high levels of interventional and outcome measure heterogeneity, and inadequate data collection and/or statistical power in respect of factors such as ethnicity and socio-economic status. It is also disappointing from a UK perspective that very little of the primary research analysed was undertaken in this country. Although many published studies on the outcomes of health behaviour change interventions in children have not reported positive results, the overall evidence available indicates that school based and other programmes, such as those designed to support parents, can have an impact on children's diets, weight, exercise habits and propensity to start smoking. However, the effect sizes reported are typically small, and there is (except in the case of smoking prevention) little robust evidence of any likely long-term health benefit.

Much remains to be learnt about issues such as the ways in which family and other care-givers influence the dietary and other health linked preferences of children in early life (Nicklas et al 2001). Few would dispute that as many children as possible should have an opportunity to develop in family settings that naturally promote healthy eating and exercise habits, and do not encourage smoking. Likewise, schools

should as part of their normal functioning support such behaviours as an accepted and valued aspect of daily life that everyone can fit in with easily. The leisure environments available to children should also be structured to afford opportunities for pleasurable and healthy activity, while offering effective protection from hazards such the illicit sale of legal and illegal intoxicants.

Against contextual considerations of this sort, policy makers must balance the case for providing special interventions (over and above reasonable normal provisions) aimed at promoting health behaviour change in children against that of investing in other, less specific, health and welfare enhancing opportunities. Seen from this perspective, evidence of interventional effectiveness alone is of little value. Costs per unit of health or wider welfare gain need to be compared. The studies reviewed here do not offer such information.

3.1.2 Health behaviour change in adolescence and early adulthood

The age at which adolescence begins varies between individuals and communities because of both biological and social factors. But it can generally be said that young men and women of later school age, or who are in the initial stages of further education and/or vocational qualification, naturally have to address the challenges of becoming independent from parentally defined environments and protective care. Experimental behaviours and risk taking of many types may be considered a normal element of their transitional strategies even though this can involve health risks, and also distress for parents.

Effective approaches to promoting healthy behaviours need to be based on a full understanding of the pressures such a context is likely to generate, and the perverse incentives they can create. One example of the latter may be taken from the field of road safety, which although outside the scope of this present analysis is salient to it. There is evidence that although schools programmes aimed at the latter increase relevant knowledge they can have paradoxical outcomes in males, essentially through increasing their desire to drive at an early age but not reducing the risk of their having accidents (Cochrane Injuries Group Driver Education Reviewers 2001).

3.1.2.1 Diet

Shepherd et al (2001, **3+A**) found evidence that school based interventions can be effective in promoting increased fruit and vegetable consumption amongst young people, and that a 'whole school' approach involving both an increased availability of foods regarded as being 'healthy' coupled with other activities (like teaching cooking skills) and interventions such as media campaigns may be of particular value. Their conclusions were in line with other reviews relating to this area, such as the work of Ciliska et al (2000, **2++B**).

Shepherd et al reported that successful dietary interventions at this life stage have been associated with small (< 5 per cent) falls in variables such as blood pressure. However, it is not possible to associate such results with long term health gains. Hence the cost effectiveness of such interventions remains uncertain.

Shepherd et al's systematic review indicates that the effects of school based interventions are likely to be greater in fifteen and sixteen year olds than in younger children, and are also more likely to be effective in young women than young men. The former are significantly more likely to show increases in diet related knowledge, and also changes in behaviour. However, as with children, the extent to which healthy (or unhealthy) eating behaviour during adolescence subsequently translates into substantive health benefits is unknown.

Perceived barriers to healthy eating range from the fact that the taste of 'unhealthy' foods appears to be preferred by a substantial proportion of young people to the reported experience of many that environments where they feel comfortable and can meet and relate to their peers are characterised by the availability of such foods. Facilitators of healthy eating identified by young people included increasing access to healthy food in both schools and their preferred leisure time environments.

Evidence statements

There is limited evidence of good quality derived principally from US studies (Shepherd et al 2001, 3+A; Ciliska et al 2000, 2++B) that schools based programmes can promote behavioural changes such as increased fruit and (to a lesser degree) vegetable consumption more effectively in young adults than in children.

The same sources indicate that young females may respond to such interventions more positively than males. Young people believe that enhancing the provision of 'healthy' foods in environments they identify with would help promote dietary improvements.

3.1.2.2 Weight control and reduction in adolescent populations

Stuart et al (2005, 2+C) conducted what they termed an integrative review of this field, which found that schools programmes can facilitate weight control and loss through exercise promoting interventions for adolescents. These may or may not include additional educational and other inputs. They also found limited evidence that dietary interventions could contribute to weight control, despite relatively high attrition (study drop out) and poor attendance rates. The most substantive results (in one case a mean reduction of 4.5 per cent in body mass index as against controls given a placebo) appeared to result from interventions that involved medicine use combined with diet and exercise change support. But such an approach may well only be viable in a limited proportion of the youth population already suffering from obesity related problems.

Stuart et al's overall conclusion was that, unlike the case with children and their families, parents and young adults should attend different groups in order to maximise the outcomes of weight control interventions, albeit that they noted some study results suggesting that African American adolescents responded positively in treatment groups involving their mothers. McLean et al (2003, 2-B) also concluded that obese adolescents 'targeted' separately from their parents were more likely to lose significant amounts of weight than those sharing an interventional environment. But this was based on just one study's findings.

In the context of ethnicity Stuart et al also noted the relative poverty of (US) research findings on groups other than whites and African-Americans, despite the fact that

adolescent obesity rates presently appear to be rising fastest amongst groups such as ‘Latinos’. These authors pointed out that in quickly changing social contexts research findings on the effectiveness of health behaviour change interventions are likely rapidly to become outdated.

In addition to interventional heterogeneity and limited participant diversity, other methodological issues identified included an absence of validity replications; unclear/inconsistent approaches to parental involvement; and limited use of conceptual and theoretical frameworks during interventional design. Other relevant points are that several authors warned that weight control and reduction programmes aimed at older children and young adults could have the undesired effect of causing (or precipitating) eating disorders in some young women and men, although this risk has not been quantified. It is also unclear as to the extent to which US based findings can meaningfully be extrapolated to UK social and economic contexts.

Evidence statements

There is a limited volume of mixed evidence, derived mainly from US studies (Stuart et al 2005, 2+C; McLean et al 2003, 2-B), that schools based exercise and dietary change programmes can be effective in helping to control or marginally reduce adolescent weight related problems.

Parental involvement can contribute to the effectiveness of interventions in this field, although evidence from these sources suggests that adolescents should be addressed in settings separate from those that their parents attend.

3.1.2.3 Physical activity

Notwithstanding the evidence quoted above in the context of weight control and reduction, Dobbins et al (2001, 2+A) found conflicting evidence on whether or not school based interventions increase physical activity rates in adolescents. There is very limited evidence that activity duration is affected by interventions made during this life stage (although one study included in these authors’ review found this to be the case in adolescent females) and there is practically no significant evidence relating such interventions to substantive changes in health status. However, such findings do not necessarily mean that physical activity rates amongst adolescent populations cannot be enhanced by appropriate health behaviour change interventions, or that

contextual variables like social norms and safe access to sports facilities or parks and countryside do not influence physical activity rates among youths/young adults.

Evidence statement

There is reasonable quality, yet limited, evidence (Dobbins et al 2001, 2+A) that physical activity rates in adolescent populations are enhanced by interventions such as schools based exercise promotion programmes.

3.1.2.4 Smoking prevention and cessation in adolescent populations

Smoking prevention and cessation are relatively well researched areas of adolescent health behaviour change. The magnitude of the demonstrable harm caused by long term smoking is such that any effective form of early stage prevention and cessation is likely to be cost effective. Sowden and Stead (2003, 2-A) found limited evidence for the effectiveness of community interventions in preventing smoking in young people. Out of nine evaluations comparing intervention communities with no intervention control communities, only two reported significant reductions in smoking amongst adolescents. These were both large scale cardio-vascular disease risk reduction programmes (one of which was undertaken in Finland, and the other in the US) aimed at entire populations, rather than selectively at adolescents. Similarly variable evidence of effectiveness was found in studies where the impact of school based interventions was measured with or without additional community programme provision.

Such results might in part be attributable to the possibility that secular trends towards reduced smoking rates have tended to obscure the impacts of broad community interventions. But Sowden and Stead concluded that community health behaviour change programmes must, to be successful, be structured effectively to reach their highest priority audiences, and be guided by both coherent theoretical frameworks and evidence based (local context sensitive, 'market tested') approaches to specific message design and delivery.

With regard to schools programmes for preventing smoking amongst children and adolescents, Thomas (2002, 1+A) also found conflicting evidence of effectiveness. This review described one British study (Nutbeam 1993) that indicated that an

intervention requiring families to discuss and discourage smoking together appeared to reduce the probability of young people remaining non-smokers, as against members of a control and an alternative intervention group. Such findings may serve as a reminder that health behaviour change interventions aimed at individuals and populations in and around adolescence can on occasions have paradoxical outcomes.

Turning to tobacco use cessation in youth groups, the Academic and Public Health Consortium (2005, **2+A**) found, in a study commissioned by NICE, that there is insufficient evidence to determine the efficacy of brief smoking cessation interventions offered to groups such as students. However, McDonald et al (2003, **2-B**) concluded that promising methods of support for adolescent smoking cessation have been developed, based primarily on the application of cognitive behavioural (CB) principles. Nine out of twenty high quality studies identified in this structured review reported increased quit rates amongst adolescents: eight were based on CB centred approaches. By contrast, all the interventions based on mandatory rather than voluntary interventions failed to show significant effects, as did one delivered at a family level.

An intervention using nicotine replacement therapy (NRT) also failed to show a significant positive outcome. This finding suggests that adolescent smoking cessation processes may differ significantly from those in adults. Success in this last instance is robustly associated with NRT use. The possible contextually related reasons for this difference may largely relate to there being a lower level of physiological addiction to nicotine in young as opposed to older smokers, and a correspondingly more significant role for cognitive and allied variables that can be regarded as under volitional control and/or peer group influence. McDonald et al in addition identified three high quality studies that involved the use of adolescent peers as communicators. One reported a positive increase in cessation rates.

Murphy-Hoefer et al (2005, **2+B**) systematically reviewed interventions to reduce tobacco use in colleges and universities. She rated five studies as 'satisfactory', out of a total of fourteen identified. Interventions in student populations appear (as might be expected from data linking knowledge change with successful health behaviour

change in better educated and/or more intelligent groups and individuals – see Batty et al 2006) to be effective in reducing smoking volumes and prevalence rates.

Both individual level cessation support and environmental interventions such as smoke free building policies have been found to be effective in these contexts. One included study found in the case of smoke free building policies that 28 per cent of men and 30 per cent of women reported smoking less as a result. However, no data were reported on differential impacts in specific sub-populations.

Two analyses, one a systematic review (Harden et al 1999, **3+A**) and one a meta-analysis (Posavac et al 1999, **2-B**) identified during the search process described in Section 2 of this review of reviews addressed the appropriateness and effectiveness of peer delivered health promotion interventions. In the youth smoking context Posavac et al reported small positive effects (Cohen's $d = 0.19$ when controls received no alternative programme, and 0.02 when this was the case) while Harden et al found three positive outcome studies, one unclear one and one that demonstrated that a peer led intervention was ineffective.

Many young adults have a positive view of peer delivered health behaviour change initiatives, although Harden et al found a need for support in classroom settings. They noted some evidence of greater effect in females, and that 'peer educators' are most likely to be high achieving young women.

Evidence statements

There is limited evidence (Sowden and Stead 2003, 2-A) that community interventions can, in some circumstances, reduce the number of adolescents taking up smoking.

There is good evidence (Thomas 2002, 1+A) that preventive school based programmes may be more effective, although the effect sizes reported are modest and some interventions aimed at reducing adolescent smoking have proved counter-productive.

There is weak evidence (McDonald et al 2003, 2-B) that with regard to enabling young smokers to quit, interventions based on cognitive behavioural principles are most effective. NRT provision is relatively ineffective in people seeking to quit smoking at this life stage.

There is mixed evidence (Murphy-Hoefer et al 2005, 2+B; Harden et al 1999, 3+A; Posavec et al 1999, 2-B) that interventions delivered in settings such as Universities and colleges, and that involve peer facilitation, have higher success rates in promoting quitting and reductions in smoking frequency than interventions delivered to young adult populations via other routes.

3.1.2.5 Summary: Contextual influences on the effectiveness of health behaviour change interventions in adolescents and young adults

The methodological problems and limitations encountered in this field overlap extensively with those noted in the context of child health behaviour change. While adolescents and individuals at the start of adulthood typically, in modern societies, require extensive parental support, they are preparing for independent living. Hence the direct involvement of families (or authority figures that can be linked to familial contexts) in the direct delivery of health promoting interventions can sometimes be counter-productive. Either because of role related social norms or more basic gender linked factors, there is evidence that young women may be more responsive to diet and other health related behaviour change information than young men.

Providing structural support for healthy eating and exercise that is well integrated into normally preferred daily contexts is likely to be the most cost effective way of promoting health protecting behaviours during this life stage. However, the potential value of interventions selectively aimed at groups with particular needs, such as obese adolescents and smokers, should also be recognised, even though some may argue these should be seen as cost effective health care measures rather than public health interventions capable of changing the determinants of health gradients at a population level. Hazards like those associated with stigmatisation should also be recognised in contexts such as obesity reduction.

3.1.3 *Pregnancy, and the beginning of parenthood*

Becoming pregnant is normally celebrated. But in some life contexts it may be unwanted, or be an instrumental act primarily directed to ends other than reproduction. These may include gaining social status and escaping from an unwanted background (Cater and Coleman 2006). Variations in motivation for becoming

pregnant and/or having a child may influence health related attitudes and behaviours during and after pregnancy. Similarly, differences in values and norms in contexts such as gender (in)equality influence male involvement in pre and post natal mother and child support. Differing patterns of health and illness between ethnic groups might in part be related to such factors.

The types of issue relevant to pregnancy and health behaviour mentioned in the materials identified for this present analysis include:

- women's nutrition (before and) during pregnancy, and its possible impact on infant and maternal health in the short and longer terms;
- decision making relating to breast feeding, and its possible impact on infant health;
- smoking during and after pregnancy, and the contextual factors that impact upon the effectiveness of interventions designed to induce and maintain quitting; and
- the value of physical activity during pregnancy.

3.1.3.1 Nutritional advice and support

Regarding the first of these topics, Contento et al (1995, **3-B**) concluded that individualised education and support is the most effective approach to facilitating nutritional improvement amongst women who might otherwise fail to make optimal behavioural choices. Kramer and Kakuma (2003, **1-A**) conducted a systematic review of the effects of advice and allied interventions on energy and protein intake in pregnancy. In five trials involving over 1,000 women advice alone was shown to increase protein and energy intake, but no consistent effect on outcomes was observed. This is compatible with the findings of van Teijlingen et al (1998, **2+A**). They concluded that women of child bearing age, as well as women who are already pregnant, are responsive to interventions designed to promote health eating in terms

of both knowledge enhancement and behaviour. Yet they could not identify health benefits resulting from this in the nine study data sets they analysed.

However, Kramer and Kakuma additionally found, via an analysis of thirteen trials involving over 4,000 women and in which balanced energy/protein supplementation was also employed, that modest increases in maternal weight gain and mean birth weight could be achieved by augmented advice. There was a decrease in the observed risks of small for gestational age births, stillbirths and neonatal deaths. But according to these authors protein supplementation alone is not beneficial, and may cause harm. Similarly, energy and protein intake restriction during pregnancy in women who are overweight does not protect against pre-eclampsia or hypertension, and may impair foetal growth.

Balanced protein/energy supplementation was not found to be especially beneficial in disadvantaged populations with less adequate access to high quality diets. From a contextual perspective the implication of these findings is that, in such a fundamental area of biological functioning, human populations are largely able to compensate for environmental fluctuations, other than exposure to gross malnutrition/starvation. Providing advice alone about 'healthy eating' is likely to be superfluous. Yet science based insights into energy supplementation can to a limited degree offer benefits in all populations.

Evidence statements

There is mixed quality evidence (van Teijlingen et al 1998, 2+A; Kramer and Kakuma 2003, 1-A) that pregnant women and others of childbearing age are frequently responsive to advice about healthy eating. But this is generally (outside specific contexts such as increasing folate consumption) ineffective in changing health outcomes for mothers and their infants.

There is limited evidence (Kramer and Kakuma 2003, 1-A) that balanced protein/energy dietary supplementation can reduce numbers of small for gestational age births, stillbirths and neonatal deaths in standard populations.

3.1.3.2 Breast feeding

Contento et al (1995, **3-B**) reported evidence that decisions to breast-feed are often taken early in, or before, pregnancy. Factors that these authors linked to the latter

included pre-conceptual and pre-natal exposure to relevant information about the convenience of breast feeding and other benefits to mothers and their babies; partner inclusion in the decision making process; and intensive support at around the time of and after birth, that may involve peer counselling. In practice breast feeding rates are highly variable. They appear strongly influenced by cultural and immediate contextual considerations. Individual choices at this level may take into account variables that health professionals are often not fully equipped to comprehend.

Evidence statement

There is limited evidence (Contento et al 1995, 3-B) that decisions about breast feeding are taken early in, or before, pregnancy. This has implications for the timing of interventions designed to promote and support breast feeding.

3.1.3.3 Smoking during and after pregnancy

There are significant differences by social class in the proportion of women who smoke during pregnancy. In the least affluent quartile of the population the rate of smoking during pregnancy is currently about twice that in the most affluent quartile. The evidence available shows that this is a cause of differences in neonate and infant mortality and morbidity, particularly if mothers (and fathers) continue or resume smoking after their baby's birth. Although McBride et al (2003, **3-B**) identified becoming aware of being pregnant as an important 'teachable moment' (Figure 2 – these authors estimate that up to sixty per cent of smokers quit at around that time) many women who give up smoking during pregnancy relapse soon afterwards.

The Academic and Public Health Consortium study (2005, **2+A**) found a body of level 1+ evidence showing that brief interventions delivered as part of routine care for pregnant smokers are not effective in increasing quit rates. Effective interventions are likely to require more intensive support. Lumley et al (2004, **2+A**) systematically reviewed 64 studies of interventions designed to reduce smoking during pregnancy. They found a fall of 6 per cent in the number of women continuing to smoke. 48 trials that measured smoking status in late pregnancy found a significant reduction in the intervention groups (RR: 0.95). [Krummel et al (2001, **2-B**) quote significantly higher figures for intensive intervention effectiveness during pregnancy. But by the criteria used in this review the Lumley et al study is a better quality source.] The data

gathered by Lumley et al indicate statistically significant reductions in pre-term and low birth weight births resulting from such interventions, and a 33gm (CI 11gm-55gm) increase in mean birth weight. The studies found were not, however, powered adequately to show declines in very low birth weight births or relevant mortality rates.

With regard to the period after birth, Edwards et al (2000, **2++B**) and Hajek et al (2005, **1-A**) reviewed the effectiveness of interventions aimed at preventing smoking relapse postpartum (and in other contexts). The former authors concluded that evidence is emerging that multi-component strategies of sufficient intensity and duration may reduce relapse rates. But it is of note that all the women in the effective postpartum study they identified were ‘spontaneous’ quitters, rather than individuals who had stopped smoking after interventions to increase their awareness of possible harm to their unborn child.

In contrast, Hajek et al found no benefit associated with both brief and skills based relapse prevention interventions for pregnant women, or any other sub-group. Hajek et al concluded that presently there is no evidence that any intervention aimed at helping short-term quitters to avoid relapse is effective, albeit they raised concerns about the research methodology and statistical power of the studies this finding was based upon.

Such research indicates that developing more effective smoking cessation interventions for men and women with infants and young children could be an important priority. Krummel et al (2001, **2-B**) reported a Head Start (the US predecessor of the British Sure Start programme) RCT that was successful in doubling (from 6 per cent in controls to 12 per cent in the intervention group) smoking abstinence rates in less advantaged black mothers with young children. This positive outcome was attributed to the combination of social support for the women involved coupled with the intervention’s focus on child protection. Replication of such work in the UK context could be a significant step forward. From the perspective of this present review on contextual influences on the effectiveness of HBC interventions the current failure of postpartum relapse prevention strategies is interesting. It may imply that the underlying motivation for quitting is an important predictor of subsequent behaviour.

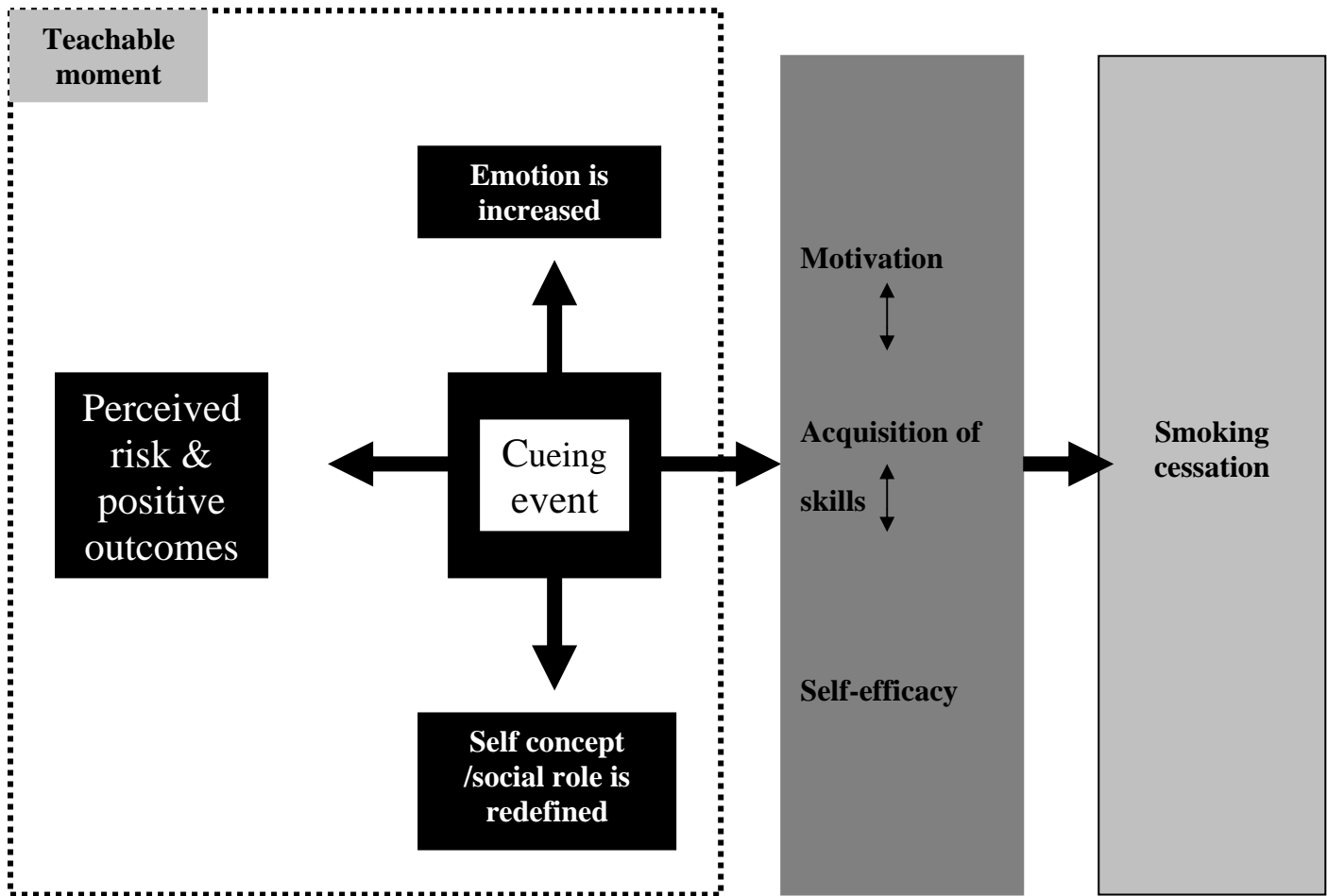


Figure 2. Heuristic model for a Teachable Moment in the smoking cessation context
Source: McBride et al 2003

The findings reported here suggest that women who give up smoking ‘for the good of the baby’ rather than their own benefit could be more vulnerable to relapse than those motivated originally to quit because they believe not smoking is in their own interest, as well as that of others significant in their lives. If so, this has important implications for communicating with pregnant women about smoking cessation. It may in the longer term be counterproductive to deliver what could be seen as coercive, baby rather than subject centred, messages about health.

Returning to the concept of teachable moments, McBride et al define these as ‘*naturally occurring health events thought to motivate individuals to spontaneously adopt risk-reducing health behaviours*’. TMs are described by these authors as having three basic components or domains – see Figure 2.

These relate to the extent that events:

- increase perceptions of personal risk or wanted or unwanted health outcomes;
- prompt strong emotional responses; and
- redefine an individual's concept of her or himself and their social role.

In addition to becoming pregnant, McBride et al argue that receiving abnormal test results, receiving a new diagnosis and being admitted to hospital are also potential TMs. For men, it may be that becoming a father might also have a similar impact. Such conceptualisations offer a potentially valuable guide to identifying social and psychological contexts (and perhaps the physical settings) that are likely to increase the effectiveness of health behaviour change interventions.

Evidence statements

There is good evidence that interventions during pregnancy can increase quit rates by an average figure of six per cent (Lumley et al 2004, 2+A).

There is good evidence (Academic and Public Health Consortium study 2005, 2+A) that brief interventions delivered as part of routine care for pregnant smokers are not effective.

There is moderate quality evidence (Hajek et al 2005, 1-A) that interventions designed to prevent postpartum relapse amongst women who quit during pregnancy are ineffective.

There is limited evidence (McBride et al 2003, 3-B) that becoming pregnant provides a context within which health behaviour change is facilitated.

3.1.3.4 Physical activity in pregnancy

Kramer (2002) reviewed ten trials of interventions that involved advising pregnant women to take aerobic exercise (at least two or three sessions a week). This was found to increase fitness levels and body image. But the data collected did not reveal any significant health risks or benefits for mothers or infants.

Evidence statement

Taking regular aerobic exercise may make being pregnant feel better for a proportion of women. But there is no evidence that produces direct health benefits (Kramer 2002).

3.1.3.5 Summary: Contextual influences on the effectiveness of health behaviour change interventions in pregnancy and at the start of parenthood

Smoking prevention remains a key health behaviour change related priority for pregnant women and young parents of both sexes. The judgement made here is that, although the available evidence base is at best only partially adequate for the purposes of this review, investing more in this field could prove a critically significant way of contributing to not only better infant health but also child and young adult health, especially in less advantaged sections of the population.

Some women of all social classes smoke during pregnancy. This suggests that there is a minority of individuals who have ‘special cause’ smoking cessation associated needs. These need carefully to be understood. But above the individual level further efforts to supply relevant information to young women and men before they have children may be of value. Smoking in and after pregnancy appears to be partly associated with a lagged collective awareness of the negative health impacts of smoking amongst members of less advantaged groups and communities.

Smoking during and after pregnancy can be driven by peer group example (contact with similar women who smoke – see Krummel et al 2001, **2-B**), perhaps especially amongst individuals who feel separated from mainstream life. To be effective, support for people in this situation may therefore need to be combined with community wide efforts to address the primary causes of such alienation. One way forward could include developing a better understanding of the ‘contextual motivation’ of women faced with the choice of smoking or quitting during pregnancy. This requires assessing not their only their personal values and expectations relating to having a child, but also their deeply embedded perceptions of the social reality that they experience. (Such approaches are employed in social and other forms of marketing. They can be related to sociological constructs such as Bourdieu’s concept of ‘habitus’ – Bourdieu 1977, Williams 1995.)

3.1.4 *Health behaviour change promotion in adulthood*

Other reviews provide overviews of the effectiveness of health behaviour change interventions in working age adults and other population groups – see, for example, Contributors to the Cochrane Collaboration and Campbell Collaboration (2000, **2+A**) and Jepson (2000, **2+B**). The central purpose of this tertiary review is not to replicate these or other more specifically focused analyses. It is to where possible identify contextual influences on the effectiveness of HBC interventions.

Individuals who have successfully negotiated their transition to independent adult life normally acquire a well-defined sense of their home and work place roles and responsibilities, including keeping as healthy as possible. However, pressures on individuals' time and other resources during adulthood often require the voluntary and involuntary prioritisation of effort. This on occasions will result in health interests being sacrificed for others. In practice convenience will often *de facto* take precedence over other, in the long term more important, considerations.

Those seeking to promote and protect adult health need to be aware of this contextually related reality. They should also, it may be argued, from an ethical perspective seek to respect the behavioural choices that adults and communities more broadly may genuinely wish to make, even if these do not give health and related (economic) productivity the importance those in authority believe it ought to have (Calnan 1994, Kessel 2006).

3.1.4.1 *Healthy eating and weight control in adulthood*

Brunner et al (2005, **1++A**) conducted a systematic review that included 29 papers describing 23 experimental studies of dietary interventions amongst adults. These were designed to improve the cardiovascular disease risk profiles of participants via changes such as reductions in salt and fat intakes and increases in fruit, vegetable and fibre consumption. Less than 25 per cent of the just over 24,000 people taking part in these studies had diagnosed cardiovascular disorders.

The overall results showed modest improvements in factors such as cholesterol levels and blood pressure, typically involving falls in the order of 2 to 5 per cent. However, these authors calculate that their findings (assuming that such reductions were maintained in the long term) are indicative of a potential 11 to 12 per cent reduction in stroke and coronary heart disease incidence respectively. Despite the fact that longer term trials reported diminished effect sizes, these observations are consistent with the view that relatively small (sustained) changes in working age adult dietary (and other) health behaviours would at a population level generate large (potentially cost effective) benefits.

Brunner et al noted that women were more likely than men to reduce their dietary fat intake and to increase that of fruit and vegetables. In the trial population as a whole, fruit and vegetable consumption increased by 1.24 servings per day. Significant outcome heterogeneity was reported. Effects among individuals who knew that they were at increased risk of colorectal cancer were larger than average, while this was not the case for those with known raised cardiovascular disease risks. The behaviour of 'blue collar' participants in the studies included was less likely to change than that of other groups in the population. These findings accord with those of other studies identified during this review of reviews. (See, for example, Ammerman et al 2001, **1+B**; Ammerman et al 2002, **2+B**; Ciliska et al 2000, **2++B**; Roe et al 1997, **2++A**; Hider 2001, **2+B**). From a contextual perspective, relevant observations derived from these analyses include the following:

- A) Brunner et al found that dietary interventions delivered in workplace settings tended to have smaller effects than those achieved in healthcare settings. Yet workplaces are important places for adult diet change related (and other) public health improvement programmes to focus on (Contento et al 1995, **3-B**; Peersman et al 1998, **1+B**). This is in part because worksite interventions can combine structural and environmental modifications with individually oriented support (and group and employment linked influences) aimed at facilitating behavioural change (Engbers et al 2005, **2++B**). For example, ingredients used in preparing food obtained in the workplace can be altered. (Low cost structural/environmental modification can also be derived from programmes aimed at, for instance, changing extra-workplace restaurant menus and

cooking practices – Hider 2001, **2+B**). However, the available evidence is very limited in relation to issues such as how less advantaged workers can most effectively be supported and protected. In practice, many companies' policies and practices result in more highly valued individuals receiving increased health advantage.

- B) Appropriate family/partner involvement may enhance the impact of dietary and allied weight control interventions aimed at adults. Evidence on the impact of interventions such as worksite programmes on adult Body Mass Index (BMI) reduction appears generally disappointing (Engbers et al 2005, **2++B**). However, McLean et al (2003, **2-B**) found mixed evidence that supporting spouses together in weight maintenance and control programmes can increase their effectiveness. Broadly, the available evidence is that spouses and other family members who wish to support behavioural change of any sort should seek to create a supportive and non-critical home context, and avoid creating tension or conflict.

- C) Evidence of the value of the primary care setting in relation to promoting dietary improvements is very limited. Ashenden et al (1997, **1+A**), in a systematic review covering ten dietary intervention trials in primary care, found inadequate evidence of effectiveness. However, these authors did not discuss in detail the likely generalisability of their findings in England. It is possible that the (evolving) British primary care model offers unique interventional opportunities in both the primary and secondary prevention contexts – see also sub-section 3.6 below.

- D) Interventions designed to be ethnically and culturally specific may have enhanced outcomes within their target populations. For example, Ammerman et al (2001, **1+B**) noted that all five of the studies in their review of the efficacy of dietary interventions to modify cancer risks that were designed to be culturally or ethnically specific reported significant decreases in variables such as total and saturated fat intake. However, it is important not to over-interpret such findings. A general characteristic of successful health behaviour

change interventions may be that they are targeted towards and tailored to meet the needs of relatively well defined audiences.

- E) Evidence on the role of theoretical frameworks in enhancing the impact of dietary interventions in adults is conflicting. For example, Jepson (2000, 2+B) concluded that dietary interventions based on theories of behavioural change are more likely to be effective than others. Yet Ammerman et al found in their studies that interventions employing a theoretical framework were not consistently more likely to report significant effects. Here again, it is important to avoid observational artefacts. It may be, for instance, that good investigators tend to report the theoretical basis of their interventions more frequently than others, and also tend to deliver interventions more effectively than others. But this does not necessarily mean that theoretically derived interventions are in fact likely to be more effective than other more empirically based interventions.

Evidence statements

There is good high quality evidence (Ammerman et al 2001, 1+B; Ammerman et al 2002, 2+B; Brunner et al 2005, 1++A; Ciliska et al 2000, 2++B; Hider 2001, 2+B; Roe et al 1997, 2++A) that interventions of various types aimed at promoting diet related behavioural change among adults can deliver modest alterations in factors such as salt, fat and fruit intakes and cholesterol and blood pressure levels.

There is high quality evidence (Brunner et al 2005, 1++A) that if sustained such changes would be sufficient to permit relatively large public health gains.

There is mixed but in part good quality evidence (Contento et al 1995, 3-B; Peersman et al 1998, 1+B; Engbers et al 2005, 2++B; McLean et al 2003, 2-B) that opportunities exist further to improve the effectiveness of structural and individually oriented interventions to promote adult dietary behavioural changes in contexts such as workplace programmes, family support and primary care.

3.1.4.2 Promoting physical activity amongst adults

Physical activity promotion programmes can complement healthy eating strategies aimed at preventing obesity and promoting fitness. A two-way relationship is likely to exist, in that undertaking exercise is normally easier if individuals weigh less and that taking exercise can help control appetite. Inactivity may well have direct effects on

the development of insulin resistance and consequently type 2 diabetes (Alberti 2006). But at present the scale and nature of this relationship is not fully understood.

This linkage may help explain observations ranging from the fact that middle aged Americans have twice the rate of diagnosed type 2 diabetes than that of their British counterparts (Banks et al 2006) to the high rates of diabetes and premature mortality seen in people with psychiatric diagnoses such as schizophrenia. Notwithstanding the possibility of iatrogenesis in this last context, reduced physical activity is associated with the symptomatology of schizophrenia. An increased propensity of people with mental health problems to develop cardio-vascular illnesses is in modern Britain likely to be an increasingly significant factor in equations relating low social status and economic disadvantage to poor physical health.

There may also be interactions between exercise and smoking rates. For example, Nishi et al (1998, **1+B**) undertook a meta-analysis of the effect of group exercise programmes on smoking cessation rates. Their results indicate that successful smoking cessation and taking exercise are positively linked. In 3 studies (out of a total of 5) where the main aim was smoking cessation the reported odds ratio was 2.35. The authors of this study suggested that the mechanisms involved may relate to enhancements in individuals' health related self efficacy, improved capacities to cope with psycho-social stress and/or a decreased tendency to put on weight as a response to nicotine withdrawal.

Hillsdon et al (1995, **1+B**) and Hillsdon and Thorogood (1996) systematically reviewed randomised controlled trials of exercise promotion. Their conclusion was that exercise levels in adults can be increased and maintained by supportive interventions. The effectiveness of the latter is primarily associated with the promotion of increased physical activity rates in the context of home/normal daily living, rather than that of special centre based activities. The promotion of moderate (brisk walking) as opposed to high intensity activities was found to be most likely to be successful. Enjoyability and convenience were found to be significant contextually related variables.

This analysis suggests that relapse prevention training may be effective for individuals who exercise alone rather than in groups (and who may therefore rely more on internal motivation than external leadership/control) and that telephone prompting increases physical activity rates in a dose related manner. That is, higher prompt rates result in higher exercise rates. However, the authors note that the US studies these findings were drawn from mainly involved white, middle aged and relatively well educated subjects, who had volunteered in response to advertisements. Their UK and wider generalisability may thus be limited.

Blue and Conrad (1995, **2-B**) also systematically reviewed 10 studies, that in their case related to worksite exercise adherence programmes. Overall, these were found to have a positive effect on exercise rates, although these authors noted a possible ‘dropping off’ in effectiveness over time. This conclusion supports the view that the co-ordinated development of work based health behaviour change programmes could usefully contribute to adult health improvement. However, Blue and Conrad also recorded a need for further initiatives relating to less advantaged employees, as opposed to interventions tested and used primarily by middle aged higher income employees.

Ashenden et al (1997, **1+A**), Lawlor and Hanratty (2001, **2++B**) and Petrella and Lattanzio (2002, **2-A**) all systematically reviewed sets of studies relating to the promotion of physical activity in general practice and other primary care settings, using brief advice and more intensive counselling techniques. They offer mixed evidence, on balance indicating that physician advice can increase physical activity levels, but not normally to a degree sufficient to improve fitness. The extent to which limited physical activity increases protect populations against risks such as developing type 2 diabetes is uncertain. Petrella and Lattanzio suggest that written materials could underpin the delivery of verbal advice, but note that time and other resource shortages may restrict physician (and other primary care professional) contributions in this area.

Morgan (2005, **2+A**) published a narrative review of evidence on the effectiveness of exercise referral schemes. It included studies from the UK, the US and New Zealand. Morgan concluded that exercise referral schemes can increase exercise rates in some

population sub-groups, and that motivational activities combined with exercise provision *per se* improve outcomes. But this research also highlighted problems relating to low recruitment and adherence rates, and their negative impact on cost effectiveness. Morgan pointed to the need to focus such services on those most likely to benefit, albeit such a strategy would not in itself necessarily mean that acceptable cost effectiveness levels will be achieved.

In this context Matrix (2005) conducted a rapid review of the economic evidence relating to physical activity interventions. This quoted (New Zealand) data indicating that the cost of converting an adult from an inactive, sedentary state to a moderately active one via exercise referral schemes is likely to be between £500 and £1,000 over the course of a year. Whether or not this would represent acceptable value for money depends on the duration of this benefit, and the probability of it over time resulting in a quantifiable health gain.

With regard to the pursuit of additional possibilities for intervening at a public health as opposed to individual care level, Dishman and Buckworth (1996, **2-B**) argued that in aggregate the (highly heterogeneous) effect sizes associated with interventions aimed at promoting increased physical activity were sufficiently large to justify ‘accelerated attention in clinical trials’. These authors introduced their study by quoting figures on the numbers of deaths and rates of disability believed to be associated with physical inactivity in the US. But as with much other research in this area, their conclusions could not be interpreted in these terms. Nor were any data provided on economic issues.

In the UK Ogilvie et al (2004, **2-A**) sought via a systematic review, including a total of 22 studies, to assess what interventions are effective in promoting shifts from using cars to walking and cycling, and what health gains might occur as a result. They found that targeted behaviour change programmes can change the habits of motivated subgroups, and that this might at a population level result in up to 5 per cent of all trips being switched away from cars. Interventions such as the provision of new railway stations and subsidies for supporting preferred commuting patterns were shown to be effective in the studies considered by these authors.

However, other interventions, such as publicity campaigns alone and extending cycle lanes, were judged ineffective. These authors found some evidence indicative of fitness and health gain among more active commuters. Yet they could not translate this into an estimate of population health benefit. They also noted that the social distribution of the effects of promoting a switch away from car travel might well be skewed. Such environmental programmes might, even if effective and in many respects eminently desirable, lead to increased health inequalities.

Evidence statements

There is mixed but nevertheless relatively robust evidence (Hillsdon et al 1995, 1+B; Dishman and Buckworth 1996, 2-B) that health behaviour change interventions can to a moderate degree increase physical activity rates in adults.

There is extensive evidence, some of it of very good quality, that physical activity promoting interventions can be delivered in a range of settings, including work places and primary health care (Blue and Conrad 1995, 2-B; Ashenden et al 1997, 1+A; Lawlor and Hanratty 2001, 2++B; Petrella and Lattanzio 2002, 2-A; Morgan 2005, 2+A).

There is limited but reasonably good quality evidence that sustained increases in adult physical activity can most effectively be achieved via the integration of exercise into normal daily life (Hillsdon et al 1995, 1+B).

There is limited evidence (Ogilvie et al 2004, 2-A) that structurally linked health behaviour change interventions can help facilitate physical activity rate changes in contexts such as commuting to work.

3.1.4.3 Smoking reduction and cessation in adult populations

For adults, smoking cessation offers a late opportunity to avoid some or all of the ill-health and distress that the use of tobacco products often causes. Smoking cessation in adult populations is a very widely researched area. Over twenty relevant reviews were identified via the search and inclusion process used for this review of reviews. Their findings are not described in detail here. However, for the purpose of seeking to define contextual influences on the effectiveness of health behaviour change interventions ten points of particular relevance are identified here:

- A) There is a robust body of high quality evidence that interventions provided by health care professionals of many types can (cost effectively) enhance quit rates by in the order of 50 to 100 per cent (Academic and Public Health

Consortium 2005, **2+A**; Gorin and Heck 2004, **2-B**; Rice and Stead 2004, **2+A**; Blenkinsopp et al 2003, **2+A**; Sinclair et al 2004, **1+A**). For example, Ashenden et al 1997 (**1+A**) reported that in the general practice context the provision of both brief and intensive advice significantly increases the odds of quitting smoking (OR: 1.32). (A direct comparison between intensive and brief advice found no statistical difference – OR: 1.07). Another study (Lancaster and Stead 2004, **2++A**) found from the evidence provided by seventeen trials that brief physician advice versus no advice increased the rates of quitting (OR: 1.74). Brief (*ad hoc*) advice on smoking cessation provided by doctors is more effective than similar advice given by pharmacists and nurses. The latter appear better able to provide more intensive advice in settings such as clinics or booked sessions in pharmacies, and to deliver cessation interventions for individuals at special risk.

- B) One possible explanation for the above finding on brief interventions relates to the high social status of doctors relative to other health professionals. But this does not appear adequately to explain why in some contexts other health professionals are able to give advice more effectively than doctors. For instance, Thompson et al (2003, **1++A**) conducted a systematic review of the effectiveness of advice given by dieticians versus others in reducing blood cholesterol (effect small but significant: - 0.25 mmol/L). They found that dieticians were more effective than doctors in communicating about dietary change. An alternative explanation for the superior ability of doctors to give brief smoking cessation advice effectively relates to the ‘contextual motivation’ of people in contact with professionals who are seeking to encourage health behaviour change. Service users’ beliefs and assumptions about the roles of the latter (which might be described as part of each individual’s health related habitus) could influence their propensity to accept healthy behaviour advice from differing sources. If so, then changing such assumptions may enable HBC goals to be pursued more efficiently.
- C) Lancaster and Stead (2004, **2++A**) reported in relation to brief interventions by physicians an NNT (number needed to treat to achieve a single desired outcome) of 40. The data they presented indicated that the provision of more

intensive interventions by physicians could approximately halve this figure, although these authors argued that this would not represent a cost effective use of medical time. However, they did not present any economic data in support of this opinion. In fact, the available information suggests that because smoking cessation is highly cost effective the additional medical time and other resource costs involved in providing intensive rather than brief interventions could well represent (notwithstanding the professional preferences involved) a good use of doctors' time, as well as that of other less well paid health service workers such as pharmacists and nurses (Rice and Stead 2004, **2+A**; Blenkinsopp et al 2003, **2+A**; Sinclair et al 2004, **1+A**). In theory, such a strategy might be of special value to more strongly addicted and/or less socially advantaged smokers seeking to quit.

D) Workplace delivered smoking reduction and cessation interventions are as effective as similar interventions delivered in other settings. Moher et al (2005, **2+A**) found that group therapy, individual counselling and pharmacological treatments are as effective in the workplace as they are in other settings, like those provided by health service providers. Using work place based strategies might allow relatively large proportions of the adult population to be reached, although these authors noted limited participation rates and a lack of cost effectiveness data. Only six of the sixty one studies their review included contained any financial information

E) Park et al (2004, **1+B**) systematically reviewed studies on whether or not interventions to enhance partner support increase quit rates when used as an adjunct to smoking cessation programmes. An increase in quit rates was not found. But these authors reported some evidence that interventions in this area are more likely to be more effective among 'live in' partners and spouses, providing they focus on enhancing positive and supportive behaviours and on minimising negative and critical behaviours. Two out of nine studies included reported odds ratios, indicating an OR of 1.64 at 6-9 months after treatment. Such observations imply that supportive as opposed to critical home settings are more likely to enable individuals to convert behavioural intentions into actions.

- F) Nicotine replacement therapy is a powerful behavioural change aid in the field of smoking cessation. Its provision can often negate the need for other forms of support. A number of the studies identified for this tertiary review explored the effects of interventions such as telephone support for individuals seeking to quit (Stead et al 2003, **1-B**), group therapy sessions (Stead and Lancaster 2005a, **2-A**), individual behavioural counselling (Lancaster and Stead 2005a, **1-A**) and the provision of self help materials (Lancaster and Stead 2005b, **1-A**). There is evidence that such interventions are individually effective. For instance, Stead et al (2003, **1-B**) concluded that telephone based counselling services, when used as the main component of an intervention, increase the chance of quitting by 50 per cent, and that they may also enhance the impact of face to face to support (OR: 1.56). But a common finding to all these studies was that, when used in an adjuvant setting in which NRT was a component of the main intervention, the additional effects of services like telephone support failed to reach significance. A general point to draw from this is that it should not be assumed that combining different HBC interventions will always have additive or synergistic effects. Contextual influences on the effectiveness of services aimed at promoting ends such as smoking cessation can include population access to substitutive products or programmes.
- G) Jepson (2000, **2+B**) did not find sufficient evidence of the effectiveness of preventing smoking in public places to be able to draw a conclusion. Yet in the same year a review conducted by the Contributors to the Cochrane Collaboration and the Campbell Collaboration (2000, **2+A**) was supportive of the introduction of smoking bans, along with other measures such as increasing the price of cigarettes and banning their advertising. Serra et al (2000, **2+B**), in a review of uncontrolled studies specifically addressing this field, found a range of positive effects of smoking bans in institutions such as hospitals and workplaces. But these authors could not quantify the overall impact of locally effective measures on total individual and population smoking rates. Serra et al found that the impact of verbal requests to desist from smoking was greater than that of signs alone, and that the impact of

communications varied with the setting. Responses were lower in recreational as opposed to functional areas. Factors such as whether or not individuals were alone or in groups also influenced their responses.

- H) The role of biomedical risk assessments in smoking cessation is uncertain. Bize et al (2005, **1+A**) found that despite the fact that recording carbon monoxide (CO) and cotinine levels among quitters can be useful to researchers seeking to validate interventional trial outcomes, there is no evidence that this in itself influences outcomes. For instance, these authors reported that three out of eight trials documented the effect of exhaled CO on smoking cessation rates: the odds ratios observed were 0.73, 0.93 and 1.18. They noted that weaknesses in the research methods and types of intervention employed mean that their findings had only limited power to predict whether and/or how the provision of credible individualised risk information, such as validated genetically based cancer susceptibility data, might serve to promote (or limit) quit rates amongst individuals and communities.
- I) ‘Quit and Win’ contests and other forms of incentivising smoking cessation through cash or other rewards are popular in some parts of the world, and have been encouraged by the WHO. It has been hoped that they may be especially effective in relatively poor populations. However, two reviews by Hey and Perera (2005a, **2+B**; 2005b, **2+A**) call into considerable question such conclusions. Despite the fact that some individual interventions have had encouraging outcomes, these authors found that overall less than one smoker in 500 quits because of entering such contests, and that there is a risk of fraud amongst competitors motivated by a desire to win prizes. Those who in the short term quit during such competitions do not in the longer term, after the prospect of a reward ceases, appear to do any better than unsupported quitters. For the purposes of this review it is relevant from a motivational context perspective to note that if individuals have been emotionally or physically coerced into adopting a healthy behaviour, or are doing so because as an instrumental measure related to a transient incentive, then they might reasonably be expected to revert to their previous behaviour as and when circumstances change.

J) Community level interventions for reducing smoking in adult populations have limited efficacy. Nevertheless, Secker-Walker et al (2002, 2+A) noted the two most robust (in terms of randomisation and statistical power) studies included (out of a total of 34) in their systematic review of this area did find an increase in quit rates, most notably amongst men. These authors also found that longer duration interventions (> two years) were more likely to be effective than shorter term ones. Overall, the evidence available on the impact of community level interventions on factors such as attitudes and perceived community norms is mixed. It appears that although women's perceptions of wider community values and expectations are more likely to be influenced by such programmes than those of men, the latter are (at least in the field of smoking cessation) more likely to act when convinced of a potential benefit. Secker-Walker et al highlight the difficulties involved in correcting for factors such as base line variations and supervening secular trends in evaluating community level health behaviour change interventions. They refer (in the context of the Heartbeat Wales campaign) to problems like the diffusion of interventional components to outside areas. These authors observed no differences of effect related to the communication channels used. But they speculate that effectiveness is a function of not only programme duration but population level awareness and participation. Awareness levels of 30 per cent were, in their data set, linked to better smoking cessation outcomes. Less than 10 per cent awareness was a universal predictor of a negative outcome.

Evidence statements

There is robust high quality evidence (Academic and Public Health Consortium 2005, 2+A; Lancaster and Stead 2004, 2++A; Ashenden et al 1997, 1+A; Gorin and Heck 2004, 2-B; Rice and Stead 2004, 2+A; Blenkinsopp et al 2003, 2+A; Sinclair et al 2004, 1+A) that interventions by health care professionals can (cost effectively) enhance quit rates. But brief advice on smoking cessation provided by doctors appears to be more effective than similar advice given by pharmacists and nurses.

There is good evidence (Moher et al, 2005, 2+A) that smoking reduction and cessation interventions are as effective as when delivered in work places as they are when provided in other settings.

There is limited evidence (Park et al 2004, 1+B) that partners can enhance quit rates. Supportive and uncritical relationships between ‘live-in’ partners are more likely to facilitate quitting than critical home environments.

There is good evidence (Hey and Perera 2005a, 2+B; Hey and Perera 2005b, 2+A) that short term incentives to stop smoking are not effective in promoting long term behavioural change, once that incentive has been removed.

There is evidence (Secker-Walker et al 2002, 2+A) that community interventions that endure for longer periods and achieve higher awareness levels are more likely to be effective in promoting smoking cessation than others. They may be more likely to change women’s perceptions of community views than those of men. But the latter are more likely to stop smoking as a result of their view changing.

3.1.4.4 Summary: Contextual influences on the effectiveness of health behaviour change interventions in working age adulthood

There is evidence from across the areas of dietary change, exercise promotion and smoking cessation that interventions aimed at promoting health behaviour changes in adults can be effective. Workplace sited interventions appear in general as likely to be as effective as similar interventions delivered in health care related environments. This suggests that they can be used to reach sections of the population less likely than others to be in regular contact with health professionals, particularly if constructive efforts are made to protect the health interests of lower paid employees. Combinations of structural intervention and targeted personal support in workplace and related settings may have the potential to reduce aspects of class (and also perhaps gender) related health inequalities.

The currently available data highlight the importance and potential cost effectiveness of further reducing smoking rates in the working age adult population. But there is growing evidence from fields such as diabetes and CHD prevention that promoting sustained improvements in levels of exercise and dietary habits such as fruit and vegetable consumption would also have significant adult population health impacts.

The less socially advantaged adults are the more difficult it normally proves for them to adopt protective behaviours. Such problems typically relate to the immediate impacts of resource restraints and ‘convenience’ issues, combined with more complex underlying factors such as the those linked to the lengths of time that different

population groups have had to adjust to affluence related risks like sedentary occupations and extended access to tobacco products and fatty foods.

However, there is also evidence of substantial heterogeneity in the effects achieved within given interventional fields. These often appear to be related to specific factors associated with HBC programme design and delivery. Such observations suggest that attempts to prescribe which areas of public health intervention are most cost effective will, if they are themselves to contribute effectively to better outcomes, need to take into account relatively detailed variables associated with factors like local environmental characteristics and communication strategies. The evidence reviewed here also indicates that to be optimally effective health behaviour change interventions should take into careful account the underlying motivational factors and relevant societal beliefs affecting individual and group attitudes and actions.

3.1.5 Health behaviour change in later life

In more affluent and educated communities chronic illnesses are relatively prevalent, and adults in later life may regardless of their health status be more likely than their younger peers to be aware of health hazards and the benefits of avoiding them. Thus although older adults' life expectancies are inevitably relatively short, interventions to promote health behaviour change may be particularly valued by (and be relatively cost effective in) people close to or over retirement age. For instance, no studies concentrating specifically on smoking cessation in later life were identified via the search and selection process used in this review of reviews. Yet older people with or at risk of cardio-vascular and lung disorders are no less likely than younger adults to derive short and medium term benefits from smoking cessation. Quitting can reduce the risk of a myocardial infarction by 50 per cent in two years.

3.1.5.1 Dietary interventions

Fletcher and Rake (1998, **2+B**) reviewed twenty three studies of interventions to promote healthy eating in later life. Unsurprisingly, they reported large beneficial effects (60 per cent plus eating adequately in the interventional group, as opposed to under 10 per cent among controls) in cases where selected populations of older people

at high risk of malnutrition were supplied with special meals services in their own homes or in day centre or other institutional settings. Such personal care interventions may be relatively costly, but at the same time they are likely to offer significant benefits to those receiving enhanced diets.

These authors found weaker evidence of benefit derived from nutritional interventions amongst other older people living in communal settings or in the community. However, one study analysed showed a large (> 50 per cent) increase in the sale of wholegrain bread to older persons following a targeted social marketing campaign. It is not possible to calculate the health gain resulting from this intervention.

In commenting on nutrition in later life Contento et al (1995, **3-B**) also highlighted the importance of individual and group interventions aimed at facilitating and supporting behavioural changes via techniques such as goal setting. These should provide support for the implementation of established intentions. They noted that older adults often already possess relevant knowledge, that they may need help with putting into practice in the context of current life challenges.

Evidence statement

Programmes that provide nutritionally appropriate meals to older people at high risk of malnutrition have relatively large effects on individual care standards (Fletcher and Rake 1998, 2+B).

3.1.5.2 Physical activity

Physical activity in later life can serve not only to promote general fitness, but to maintain individuals' abilities to cope with independent living. Cyarto et al (2004, **2-A**), in a review that included reports from twenty one randomised controlled trials along with eight other physical activity studies, found wide evidence of immediate positive effects. Examples include increases in participant strength and in functional measures like physical mobility, and improved control of risk factors like those associated with diabetes. All the included general practice/primary care intervention studies designed to promote increased physical activity were also positive. Tailored

interventions maintained over extended periods are most likely to have relatively large effects.

Ashworth et al (2005, 1++B) showed that although in the short term centre based programmes may initially achieve greater success than home based programmes, the latter are more likely to be effective maintaining increased activity levels in the longer term. Given the importance of effect duration in relation to health risk reduction, this is an important observation. Ashworth et al argue that walking is a good form of exercise, although noting that in later life problems such as arthritis can present barriers to maintaining physical activity.

Their analysis indicates that older individuals with particular activity related needs may benefit from clinic based or other special services that might well be cost effectiveness in their circumstances. Yet programmes aimed at facilitating more active normal daily lives will probably better serve the wider population.

Similar findings were reported by Dishman and Buckworth (1996, 2-B). They undertook a meta-analysis of interventions designed to increase physical activity. Dishman and Buckworth concluded that amongst older and other adults interventional effect sizes did not appear to vary significantly between population sub-groups; that they were generally greater amongst healthier subjects; that those interventions using behavioural modification techniques are more effective than programmes focused on knowledge improvement alone; and that the use of mediated approaches (such as media assisted programmes) are likely to more effective and efficient than those relying on face to face contacts alone. These authors' also favoured unsupervised and leisure time oriented physical activity interventions as against supervised and formalised provisions.

Evidence statement

There is good quality evidence (Ashworth et al 2005, 1++B; Dishman and Buckworth 1996, 2-B) showing that although in the short term centre based programmes for promoting physical activity are often more effective than home based programmes, the latter are more likely to be effective in maintaining increased activity levels in the longer term.

3.1.5.3 Summary: Health behaviour change in later life

In older populations there is typically an increased requirement for individual care initiatives, aimed at meeting needs such as those for adequate nutrition and the promotion activity levels necessary for sustaining independent living abilities. Such interventions might often best be seen as forms of personal nursing care. But at the public health level older individuals can also benefit significantly from population interventions aimed at reducing smoking and promoting exercise and healthy eating.

Indeed, although relevant data was not found via the search undertaken for this tertiary review, it may be that on a per capita basis people at this stage of life are in the short to medium term in a position to gain as much or more from health behaviour change interventions than any other group. This is in part likely to be a function of their relatively high level of vulnerability, and in part associated with their ability to respond to relevant health messages.

3.2 Gender and health behaviour change

Throughout the last two centuries men in Britain have had significantly shorter (~ 5 years) average life expectancies than women. Health risk related behaviour variations in adult life, including smoking, excessive alcohol use and vulnerability to traffic accidents, in large part account today for this continuing difference, which is similar in scale to the mortality inequalities observed between richer and poorer classes in UK society.

There is a need for an informed awareness of the health challenges facing men of all ages. However, in modern post transitional societies, in which gender related inequalities of various types may be declining, it may be that more ‘masculinised’ behaviours in areas such as alcohol use will expose the female population to new levels of risk. The gender related studies identified here relate primarily to the needs of women. This is in part because women face the special challenges of child bearing. In association with reproductive and social role factors, women may also have particular mental and physical health needs in contexts such as breast cancer, depression and menopause (Lange-Collett 2002).

Krummel et al (2001, **2-B**) reviewed 51 studies relating to the prevention of cardiovascular disease in women via changing smoking, diet and activity related behaviours. They also noted in the context of smoking that women are more inclined to respond attitudinally to community interventions than men. But this may not make them more likely to quit (Secker-Walker et al 2002, **2+A**). Associated with this difference, social support networks seem to be more important to female as opposed to male well-being. It is uncertain whether such differences reflect socialised characteristics, or more inherent sex-linked variations.

With regard to physical activity rates Krummel et al concluded that behavioural strategies utilising techniques such as self-monitoring and feedback can increase exercise rates, and that women respond better to lifestyle related physical activity interventions than structured exercise programmes. This is consistent with other evidence sources referred to earlier in this review of reviews. (See, for instance, Fletcher and Rake 1998, **2+B**.)

From a contextual perspective, women from many cultures seem more inclined than men to assume that physical activity is embedded in their family care and home roles, and that it is wasteful of time and effort for them to seek additional sports/leisure based physical activity (Belza and Warms 2004, Wilcox 2002). But attitudes like this can on occasions serve to hide asymmetries between male and female power relationships within ethnic and other social groups. If women cannot, for instance, share sporting venues with men, and do not have access to alternative facilities, it may not be surprising that they 'choose' to exercise less.

In the context of dietary change, Krummel et al commented that few relevant interventions have been tailored specifically for women. But there is evidence that both younger and older women tend to respond more to dietary information than males, in terms of both the knowledge they gain and the action they take. (See, for example, Brunner et al 2005, **1++A**; Shepherd et al 2001, **3+A**.) It may be that the apparent tendency of women to respond more to dietary interventions, and for men to be more inclined to take up structured physical activity recommendations, is in a motivational context linked to differences in their gender roles and associated behavioural expectations. In today's social conditions such concerns could also be

relevant to patterns of smoking cessation, and the attendant possibilities of weight gain on the one hand as against fitness facilitation on the other (Nishi et al 1998, 1+B).

Evidence statements

There is limited evidence (Krummel et al 2001, 2-B; Brunner et al 2005, 1++A; Shepherd et al 2001, 3+A) that women are more likely than men to respond positively to health behaviour change interventions aimed at promoting healthy eating and restricting weight gain. But at the same time they may in some (if not all) social groups be less likely to respond positively to exercise promotion interventions, other than those aimed at increasing physical activity in the context of normal daily living.

In the context of smoking cessation there is good quality yet limited evidence (Secker-Walker et al 2002, 2+A) that women's attitudes may change more than those of men in response to community interventions. But this does make them more likely to quit.

3.3 Income, social position and health

Differences in income and social position are strongly related to health status variations (Drever and Whitehead 1997; The Acheson Report 1998; Graham 2000). There is in Britain today a clear association between relative social disadvantage and behaviours like smoking and 'junk food' consumption. However, the mechanisms linking 'low' social class and high relative rates of morbidity and mortality may be more complex than is sometimes assumed.

On the one hand low social status might in itself have a negative effect on health outcomes, independently of identified CVD and cancer risk factors such as smoking, raised cholesterol and obesity (Marmot 2006). On the other, a dynamic historically based view of habits such as smoking and problems like obesity shows that their relationship with social position has changed over time (see Appendix 1). In the past they have served as markers of relative wealth and sophistication, rather than relative poverty and lack of education.

The Contributors to the Cochrane Collaboration and the Campbell Collaboration (2000, 2+A) emphasised in their review of reviews on the effectiveness of public health strategies the importance of structural change programmes, such as those aimed

at increasing the relative cost of smoking. They quoted research indicating that interventions aimed at enhancing knowledge and choice are more likely to benefit advantaged groups than those whose health behaviours are determined more by environment pressures (Gepkens and Gunning-Schepers 1996, **2-A**). However, the Cochrane Collaboration and the Campbell Collaboration authors also observed that if poorer people are typically more heavily addicted to nicotine than more affluent smokers, they may be on average more likely to respond by diverting expenditure away from other areas, such as food purchasing.

In the context of income and price related effects on smoking cessation, Kaper et al (2005, **1++C**) systematically reviewed the impact of alternative approaches to health care funding on interventions to enhance quit rates. Their conclusion was that full funding of smoking cessation interventions (that is, funding that from a consumer perspective makes such services free at the point of demand) is at a population level more effective in reducing smoking rates than partial funding (involving co-payments) or no funding other than via consumer out of pocket payments.

As compared to the latter approach, full funding of smoking cessation services increased self reported abstinence rates by approximately 50 per cent. Given the positive economic returns associated with decreased smoking rates, this indicates that the extension of free NHS smoking cessation services is likely to have been a cost effective public health improvement strategy.

Taylor et al (1998, **2-D**) systematically reviewed fourteen US studies with the intention of assessing the effectiveness of interventions to promote increased physical activity rates in low-income groups, ethnic minorities and people with disabilities. Programmes addressing the needs of people with physical disabilities were found to be effective in facilitating enhanced activity rates. But these authors identified no studies concerning physical exercise promotion in low income groups, other than research into the effectiveness of interventions aimed at ethnic minority, and particularly Afro-American, populations.

Evidence statements

Variations in health behaviours and outcomes are strongly linked to socio-economic and allied variables. There is evidence (Gepkens and Gunning-Schepers 1996, 2-A; Contributors to the Cochrane Collaboration and the Campbell Collaboration 2000, 2+A) that structural interventions that affect the health behaviour of the entire population are more likely to reduce health inequalities than interventions focused primarily on increasing knowledge and facilitating informed choice.

There is good equality evidence (Kaper et al 2005, 1++C) in the context of smoking cessation that fully funded preventive interventions are, particularly if they are to reduce health inequalities, more likely to be effective than partly or consumer payment funded interventions.

3.4 Ethnicity and health behaviour change

There is a risk that analyses based on ‘untheorised ethnicity’ will (like naïve approaches to the health inequalities associated with socio-economic positioning) over-state the inherent differences between people from different cultural backgrounds and/or who have varying genetic endowments. The general effects of material factors like income, housing, access to education and employment should not be falsely attributed to ethnicity *per se*.

The authors of the study on physical activity promotion in less advantaged groups referred to above (Taylor et al 1998, **2-D**) noted that in the US research they reviewed there were no studies on the impact of low income *per se*. With regard to ethnicity, the two studies they identified that showed consistent positive effects were weight loss programmes for women. Taylor et al also noted (with other authors) that physical activity interventions for particular ethnic groups have only been developed for African-Americans and Mexican Americans. They argued that in the US context more research is needed on the requirements of the Asian and Latino populations.

Similarly, from a British perspective more informed distinctions may need to be made between the health behaviour related needs of members of Hindu, Muslim and other religious groups within the local South and East Asian populations. It is also the case that studies on interventions amongst African Americans are likely to have only limited relevance to health behaviour change in British people with African or West Indian ethnic backgrounds.

With regard to diet and ethnicity, White et al (1998, 2+A) pointed to a dearth of relevant studies in the UK. They found that valid conclusions could not be drawn from much of the research available because of methodological limitations. But these authors' suggest that 'culturally tailored' one to one, small group and adult class based interventions can be effective in changing the eating patterns of people in ethnic minority groups. This is consistent with the findings of Ammerman et al (2001, 1+B) in relation to total and saturated fat intake, and the recommendations of the Contributors to the Cochrane Collaboration and the Campbell Collaboration (2000, 2+A). Yet the extent to which investment in culturally/ethnically specific health behaviour change interventions is likely to be cost effective cannot be calculated from the data available in these studies.

Lawrence et al (2003, 2-C) included thirty six studies in a narrative review of US ethnic and racial minority smoking cessation interventions. While recording the lack of attention paid to groups such as native American Indian and Alaskan native populations, they found some evidence of positive effect being gained via ethnically specific programmes. Stead et al (2003, 1-B), in a review of evidence on telephone counselling for smoking cessation, noted that (in combination with targeted advertising) services based on this communication channel might provide a cost effective way of supporting minority populations. As the main component of smoking cessation interventions, these authors found that proactive phone counselling increases the relative chance of quitting by 50 per cent. Strategies based on the use of telephone services might also help affordably to overcome language related problems affecting groups that are relatively isolated in the community and who may be difficult to contact personally, albeit that Stead et al reported that presently well educated white women tend to be the most frequent users of telephone based health services.

Evidence statement

There is a lack of robust research based evidence on the extent to which members of ethnic minority groups can benefit from culturally specific health behaviour change interventions, over and above the benefits they can gain from less specifically targeted interventions. However, White et al (1998, 2+A) and Lawrence et al (2003, 2-C) found limited evidence that appropriately tailored interventions can have enhanced effectiveness in changing the eating and smoking patterns of people from ethnic minorities.

There is weak evidence (Stead et al 2003, 1-B) that targeted telephone based services may be of value in aiding smoking cessation, especially in contexts where personal contact opportunities are limited.

3.5 Place and health behaviours

Place, defined in terms of geographical location, the dynamics of neighbourhood and the history and physical characteristics of areas, can have a significant impact on individual and community health – see, for example, Gatrell et al 2000. Examples of relevant variables range from climate to the cultural heritage imparted by the rise and decline of enterprises like, say, mining and ship and car building. The contrasting health of communities in areas such as northern and southern England and Wales may be affected by the adoption of behaviours such as smoking as a way of proclaiming and defending local identities in the face of perceived threats.

However, none of the studies identified for the purposes of this tertiary review were aimed specifically at elucidating the influence of place on the effectiveness of health behaviour change interventions. The only conclusion it is appropriate to draw, therefore, is that although locational context is a potentially important variable to take into account when designing health behaviour change programmes its components do not appear as yet to have been systematically identified and quantified.

3.6 Other context related influences on the effectiveness of interventions to promote behavioural change

This Section has described evidence relating to a wide range of contextual influences on the effectiveness of health behaviour change interventions. In addition to those associated with the broad categories of life stage, gender, ethnicity and socio-economic and geographical positioning, they have included more specific factors linked with communication channel selection, the status of the individuals involved in interventional delivery, and the motivations of the individuals and groups to whom health promotion programmes are addressed. Many additional issues could be explored. But for the purposes of review five further sets of context related findings have been identified.

- A. A number of the studies described earlier offer evidence suggesting that individuals with diagnosed long term conditions may respond more positively to relevant HBC interventions than their apparently healthier peers. A number of caveats ought to be placed against this observation. For example, the behaviour of adolescents and young adults with chronic illnesses such as diabetes (who may on occasions be strongly motivated to deny their condition) could well differ from that of older people. Nevertheless, van Berkel et al (1999, **2-A**) found robust evidence that smoking cessation interventions amongst adults with coronary heart disease are normally more effective than similar interventions amongst the general population. Their meta-analysis of ten smoking cessation intervention studies reported a 61 per cent quitting rate in the intervention group, as opposed to 42 per cent in the control group (OR: 0.5). These researchers concluded that people recovering from myocardial infarctions, which can be seen as providing a warning of serious illness, are most likely to respond positively to relevant behaviour change interventions. By contrast, patients recovering from planned surgical interventions for heart and related disorders may believe themselves to 'cured', and are therefore less likely to respond positively. Similar interpretational errors likely to reduce the effectiveness of HBC interventions may be found in, for example, health service users with diabetes who are 'discharged' from secondary out patient care to primary care, if they see GPs as being primarily concerned with mild as opposed to severe illness.
- B. Faith related organisations can provide settings for the effective delivery of health programmes, alongside workplace, school and other locations. DeHaven et al (2004, **2-B**) published a narrative synthesis reporting successful interventions in churches and allied buildings. The great majority of these involved African Americans. Areas of activity ranged from prostate cancer knowledge promotion to smoking cessation, increasing fruit and vegetable intake and the reduction of symptoms of mental distress. Although there is no evidence that interventions delivered in religious settings are more likely to be effective than similar programmes delivered in other contexts, this approach may offer ways of reaching populations that are relatively difficult to contact via other channels.

- C. Computer and internet based interventions may be able to offer new low cost ways of reaching selected populations, and providing them with information, peer group support and professional advice. Bessell et al (2002, **1-B**) reviewed ten studies on the public's use of online health information and internet plus additional service interventions. Positive effects were found in fields such as smoking cessation, weight loss and dietary improvement. Wantland et al (2004, **2+B**) conducted a meta-analysis of the effects of web-based interventions aimed at ends such as weight loss, exercise promotion and dietary change. Small to moderate effect sizes were recorded in a range of knowledge improvement and behavioural change dimensions (11 studies: range of effect sizes 0.01-0.47). A reduced number of cardio-vascular events was claimed in one study. No conclusion could be drawn as to the absolute efficacy of website based relative to other interventions. Yet the fact that positive effects were recorded indicates a potential for the cost effective use of this channel in populations that wish to employ it in the context of health improvement.
- D. Tailoring interventions can in some contexts enhance their efficacy. Ryan and Lauver (2002, **2-A**) systematically reviewed twenty studies comparing tailored (personalised) informational interventions (TIs) to standardised interventions (SIs). Just half those included showed a superior effect (over and above simple consumer preference) for TIs, which tended to have larger effects than SIs. The evidence these authors present suggests that TIs were more effective in relation to promoting dietary change than SIs, although this was not found to be so in the smoking cessation context. Ryan and Lauver found interventional tailoring to have an increased effect when it facilitated ipsative feedback. That is, when it allowed individuals to access comparative information about their past and present behaviours.
- E. Mass media reports in modern societies allow individuals and groups to locate themselves within a wider national and international framework, and serve to guide their interpretation of information and events. For instance, television can provide a platform that enables famous individuals to offer themselves as

role models in areas ranging from participation in sporting activities to smoking (or not smoking) during pregnancy. Many of the reviews referred to in this analysis acknowledged the potential power of such media based communications to influence the outcomes of health behaviour change interventions. However, few presented substantive evidence relating to the scale of the effects achievable via mass media based interventions alone, or as adjuvants to personal and group interventions.

Evidence statements

There is limited evidence (van Berkel et al 1999, 2-A) that individuals provided with information and support at timely points in the development of given types of illness, such as shortly after a first myocardial infarction, are relatively well motivated to change their behaviours.

There is weak evidence (DeHaven et al 2004, 2-B) that faith based interventional settings may facilitate effective communication with groups less easily accessible via other routes.

There is limited mixed quality evidence (Bessell et al 2002, 1-B; Wantland et al 2004, 2+B) that targeted internet based services are a potentially cost effective means of supporting health behaviour change, at least amongst sections of the population able and motivated to use this channel.

There is relatively weak evidence (Ryan and Lauver 2002, 2-A) that tailored interventions that allow ipsative feedback are more effective than standard interventions.

4. DISCUSSION AND CONCLUSIONS

4.1 Summary of evidence

There is good quality evidence that school based interventions for children, and particularly those that appropriately involve and support parents, can achieve desired dietary changes (Roe et al 1997, **2++A**; Tedstone et al 1998, **2+A**; Ciliska et al 2000, **2++B**; Ammerman et al 2001, **1+B**; Ammerman et al 2002, **2+B**; Shepherd et al 2001, **3+A**). These typically represent an increase in fruit consumption of around one serving per day. However, the duration and ultimate health impact of such effects is unknown, and changes in children's knowledge are not consistently linked to their behaviour (Contributors to the Cochrane Collaboration and the Campbell Collaboration 2000, **2+A**; Tedstone et al 1998, **2+A**; Hider 2001, **2+B**). In addition, interventions aimed at weight control and obesity prevention appear to be of only limited effectiveness (Summerbell et al 2005, **2+A**).

School based programmes are also modestly effective in increasing physical activity levels in children (Dobbins et al 2001, **2+A**; Brunton et al 2003, **2+B**). They can have a limited impact on relative rates of smoking (Thomas 2002, **1+A**). Restrictions on children's access to tobacco might augment such effects, providing that high rates of compliance are achieved throughout localities. But the overall impact of such interventions is again uncertain (Stead and Lancaster 2005a, **2-A**), as is the cost effectiveness of virtually all schools based HBC interventions.

Among adolescents, schools based programmes can be effective in promoting behaviour changes such as increasing fruit and (to a lesser degree) vegetable consumption (Shepherd et al 2001, **3+A**; Ciliska et al 2000, **2++B**). They can also be effective in helping to control or marginally reduce weight related problems in selected groups of adolescents (Stuart et al 2005, **2+C**; McLean et al 2003, **2-B**), and enhancing physical activity rates (Dobbins et al 2001, **2+A**). They may also to a limited degree be successful in preventing smoking and/or supporting smoking cessation in young smokers (Thomas 2002, **1+A**; McDonald et al 2003, **2-B**). As with children, the long term population level impact and cost effectiveness of most schools based HBC interventions for adolescents is essentially unknown, albeit that there

appears to be a stronger case for supporting smoking prevention and cessation programmes in higher education settings (Murphy-Hoefer et al 2005, **2+B**; Harden et al 1999, **3+A**; Posavec et al 1999, **2-B**). The latter may, however, tend to increase health inequalities over time, if not balanced by other interventions aimed at less educated populations.

The context provided by pregnancy and early parenthood can be a timely point to change health behaviours (McBride et al 2003, **3-B**). There is evidence of mixed quality showing that pregnant women are responsive to advice about healthy eating, although this is generally ineffective in changing health outcomes for mothers and their infants (van Teijlingen et al 1998, **2+A**; Kramer and Kakuma 2003, **1-A**). With regard to breast feeding, the available evidence shows that relevant decisions are taken early in, or before, pregnancy. This has important implications for the timing of interventions to promote and support breast feeding (Contento et al 1995, **3-B**).

Brief interventions delivered as part of routine care for pregnant smokers are not effective (Academic and Public Health Consortium 2005, **2+A**), although other interventions during pregnancy have been found to increase quit rates by six per cent (Lumley et al 2004, **2+A**). There is no evidence that interventions designed to prevent postpartum relapse amongst women who quit during pregnancy are effective (Hajek et al 2005, **1-A**). Regarding physical activity in pregnancy, there is similarly no evidence that taking regular aerobic exercise produces direct health benefits for pregnant women or their babies, although it may sometimes make pregnancy feel better.

In adulthood interventions of various types aimed at promoting diet related behavioural change can deliver modest alterations in factors such as salt, fat and fruit intakes and cholesterol and blood pressure levels (Ammerman et al 2001, **1+B**; Ammerman et al 2002, **2+B**; Brunner et al 2005, **1++A**; Ciliska et al 2000, **2++B**; Hider 2001, **2+B**; Roe et al 1997, **2++A**). Further potential opportunities exist to improve health in contexts such as workplace programme extensions, family support and primary care improvement (Contento et al 1995, **3-B**; Peersman et al 1998, **1+B**; Engbers et al 2005, **2++B**; McLean et al 2003, **2-B**).

Health behaviour change interventions can to a moderate degree help increase physical activity rates in working age adults (Hillsdon et al 1995, **1+B**; Dishman and Buckworth 1996, **2-B**), although to be sustained exercise is for many better undertaken at home or otherwise integrated into normal daily life. As with dietary change, significant uncertainties exist about the duration of the effects of interventions to promote increased exercise rates in adults. Hence their cost effectiveness over time cannot reliably be stated.

By contrast smoking cessation interventions provided to adults by all types of health care professional can with reasonable degree of confidence be said to cost effectively enhance quit rates. Brief advice on smoking cessation provided by doctors appears to be more effective than similar advice given by pharmacists and nurses (Academic and Public Health Consortium 2005, **2+A**; Gorin and Heck 2004, **2-B**; Rice and Stead 2004, **2+A**; Blenkinsopp et al 2003, **2+A**; Sinclair et al 2004, **1+A**). The available research also indicates that smoking interventions delivered in work places are as effective as when delivered in other settings, and may if appropriately provided reach people not otherwise likely to receive such services (Moher et al, 2005, **2+A**). However, interventions which offer short term incentives to stop smoking are not effective in promoting longer term behavioural changes, once the incentive has been removed (Hey and Perera 2005a, **2+B**; Hey and Perera 2005b, **2+A**).

In older populations there is typically an increased requirement for individual care initiatives, aimed at meeting needs such as those for adequate nutrition and activity levels necessary for sustaining independent living abilities (Fletcher and Rake 1998, **2+B**). But in public health terms older individuals can also benefit significantly from population level interventions aimed at reducing smoking rates and promoting exercise and healthy eating in normal contexts (Ashworth et al 2005, **1++B**; Dishman and Buckworth 1996, **2-B**). People at this stage of life may in the short to medium term be in a position to gain as much as or more from health behaviour change interventions than any other group. This is in part a function of their relatively high level of vulnerability, and in part associated with their potential ability to respond to relevant health messages.

The evidence gathered during this review suggests that significant gender related differences exist in responses to health behaviour interventions. There is moderately strong evidence that women are more likely than men to respond positively to health behaviour change interventions aimed at promoting healthy eating and restricting weight gain. At the same time many women may be less likely to respond positively to exercise promotion interventions, other than those aimed at increasing physical activity in the context of normal daily living (Krummel et al 2001, **2-B**; Brunner et al 2005, **1++A**; Shepherd et al 2001, **3+A**). With regard to smoking cessation women's attitudes may change more than those of men in response to community interventions. But men may be more likely to quit (Secker-Walker et al 2002, **2+A**). From a contextual perspective the available HBC research does not explain the extent to which such differences are a function of cultural and other contextual, as opposed to more inherent biological, differences.

Variations in health behaviours and outcomes are strongly linked to socio-economic and allied variables. Disappointingly, the search conducted for this review found no studies that had investigated in any significant depth the mechanisms underpinning relationships between income and social positioning and the success or otherwise of health behaviour interventions. However, it is relevant to note that there is evidence that fully funded smoking prevention interventions are, if they are to reduce health inequalities, more likely to be effective than co-funded or fully consumer payment funded interventions (Kaper et al 2005, **1++C**).

There also appears to be a lack of focused research evidence on the extent to which, and why, members of ethnic minority groups may benefit from culturally specific health behaviour change interventions, over and above the benefits that they can gain from less specifically targeted interventions.

There is evidence that individuals provided with information and support at timely points in the development of given types of illness, such as shortly after a first myocardial infarction, are more motivated to change their behaviours than during periods when they have accommodated to their change in health status (van Berkel et al 1999, **2-A**). Faith based interventional settings may also facilitate effective communication with groups not easily reachable via other routes (DeHaven et al

2004, **2-B**). So too may the provision of targeted internet based services (Bessell et al 2002, **1-B**; Wantland et al 2004, **2+B**).

4.2 Personal choice and structural change

The research question addressed by this review was '*How does the social and cultural context in which people live influence the effectiveness of interventions to change (health) knowledge, intentions and behaviour?*'. But the evidence summarised above has only a limited capacity directly to provide answers relevant to this inquiry. One of the main conclusions that can be drawn from the information gathered is that outside the area of smoking prevention and cessation support in adults it is not at this stage possible to state robustly which broad types of (and targets for) health behaviour change intervention are likely to be most (cost) effective. Similarly, the evidence gathered during this study indicates that it would be wrong to assume that differences in gender, ethnicity and class are consistent markers of different levels of responsiveness to health behaviour change interventions.

There are many potentially important opportunities to support exercise and dietary changes across all life stages, and in a wide range of social contexts. Yet given the presently available biomedical and health promotion science evidence base, considerable caution should be taken in offering generalisations about what options are most desirable and/or viable. Within any specific area some interventions can offer significant health gain and good value for money, while others will not. This situation is further complicated by the fact that some of the most important impacts of HBC interventions may relate to their capacity to influence secular trends, rather than their more immediately measurable impacts on individuals and groups.

Given this, the quality of individual project planning and delivery may, for present planning and funding decision purposes, often be taken to be the most significant differentiator between successful and less successful interventions. Much recent debate about public health policy and the reduction of health inequalities has concentrated on the merits of promoting informed individual choice, as against those of interventions which (like legislation requiring the wearing of seatbelts) have a general 'structural' impact. That is, interventions that affect the entire community,

regardless of variations in personal volition. These are likely to be of particular benefit to people living in circumstances that are unsupportive of voluntary behavioural change. They are also likely to be more cost effective than those which require extensive programmes of persuasion and support (Wanless 2004).

However, public health policy makers are not in reality in an 'either or' situation. It can be argued that in today's social conditions a pragmatic balance is required between structural intervention – when this is demonstrably beneficial and politically viable – and the effective support of informed health behaviour choice (Blair 2006). The latter may be especially relevant in circumstances where a majority of an electorate is uncertain of the benefits of preventing health harming behaviours. Individually oriented progress towards the adoption of healthier options could in such social and political contexts eventually open the way to structural protection. Recent moves towards banning smoking in public places illustrate this point.

Such observations underline the fact that the effectiveness of health behaviour interventions is not simply a function of their capacity to influence individual cognitive processes. Their impact is in large part shaped by wider social processes, and the physical environments in which people live and exercise choice. The overall analysis provided by this review highlights the importance of variables such as the perceived credibility of health promotion messages (and messengers) amongst groups and communities, as well as the strength of the biomedical evidence available relating to specific forms of anticipated health gain.

The (cost) effectiveness of health behaviour change interventions depends critically on the scale of the individual and population level 'end point' health benefits derived from the actions being encouraged, rather than on the sizes of intermediate effects. Much of the research analysed during the course of this study apparently fails fully to appreciate this fact, presenting instead heterogeneous sets of observations on intermediate 'behavioural process' effects. These are at best only indirect indicators of public health outcomes.

However, putting such concerns aside, it can be said that more effective interventions are not normally aimed at simply providing information and increasing knowledge

levels. Rather, they seek more directly to support behavioural change through measures such as enhancing motivation and removing environmental barriers to action. As detailed in Section 3, examples of the latter range from goal setting (Ammerman et al 2001, **1+B**; Ammerman et al 2002, **2+B**) and employing CBT based techniques in, for example, the context of adolescent smoking cessation (McDonald et al 2003, **2-B**) through to increasing convenient access to healthy foods in environments like schools (Shepherd et al 2001, **3+A**). Evidence showing that exercise levels in later life are more likely to be enhanced and maintained as a result of home based interventions also serves to highlight the relevance of convenience (alongside factors such as enjoyability and affordability) as a determinant of day-to-day behaviour (Ashworth et al 2005, **1++B**).

The narrative and empirical evidence contained in the studies included in this tertiary review also indicates that the frequency, source plurality (multi-source communications may have a greater impact than a similar volume of single source communications), goal specificity (single aim communications may have a greater impact than those with diverse aims) and duration of health message delivery also help to determine interventional effectiveness. Programmes that last for longer periods and have high awareness ratings and clear, interesting and credible messages are likely to be more effective than brief, less widely noticeable interventions with unclear ends and unconvincing messages. The extent to which interventions are mediated via the use of factors such as media coverage, written materials, internet communications and third party comment additionally influences their (cost) effectiveness. Although there are exceptions, ‘value for money’ is likely to be limited in the case of interventions that rely just on face-to-face interactions.

The channels by which messages are delivered and the settings in which they are received can also affect interventional effectiveness. So can the status and perceived role of the individuals involved in the communication process. But the size of these effects often seems, on the basis of the evidence reviewed here to be relatively small. Media channel and professional group linked effect size variations may in large part dependent on audience perceptions of appropriateness. These might well be amenable to change via well designed interventions.

Cultural preferences, community values and social capital linked influences (ranging from varying levels of trust in ‘official’ health messages to, for example, the availability of safe areas for sport, and the extent to which smoking is locally accepted as desirable and normal as opposed to undesirable and exceptional) exercise a further influence on the effectiveness of health behaviour change interventions. Against this, there is evidence that targeting and tailoring interventions to meet the needs, expectations and cultural requirements of particular groups can to a degree offset the negative impacts of such contextual variables. (See, for instance, White et al 1998, 2+A; Ryan and Lauver 2002, 2-A.)

It might be argued that attempts should be made to combine data on the impacts of factors like those noted above in a summary format, to provide a rapid guide as to which HBC interventions can most confidently be expected to be (cost) effective. However, if such an approach is adopted, care should be taken to ensure that service commissioners do not apply the resulting evaluative instrument in a simplistic manner. Each case ought to be considered on its merits, against a broad understanding of the contextual and other considerations likely to impinge on HBC interventional effectiveness.

4.3 Conclusions: commissioning more relevant research

Variations in what can perhaps be best described as health related behavioural fashion clearly exist. Growing awareness of this fact may in future lead to a greater emphasis on the use of ‘social marketing’ techniques to attain public health goals (Adshead 2006 and Mayo 2006 – this topic is the subject of another NICE CPHE commissioned review). Other issues raised by the direct and deductive findings of this tertiary review relate to the differing needs of children and adolescents as opposed to working age and older adults; the role of medicines as instruments of public health improvement alongside more conventional HBC programme components; and the value of psychological theory in HBC interventional design and delivery.

However, it is most relevant to conclude here by re-emphasising the point that many of the authors of reviews included in this analysis have complained of interventional and effect measurement heterogeneity, and that the effects reported frequently cannot

satisfactorily be linked to either health outcomes (Ketola et al 2000, **1-B**) or interventional costs. This largely precludes the meaningful application of techniques such as meta-analytical review, and cost effectiveness analysis. The current body of (English language) research on the effectiveness of HBC interventions might in overview be described as a disparate literature relating primarily to US experience. On occasions, investigators appear to have been influenced more by provider side aspirations and requirements than those of the patients and public that health services of all types exist to serve.

There is thus an arguable need for a more coherent, adequately funded, public health research commissioning approach in England (and/or the UK and the EU more widely) which seeks to build constructively on work to date that has justifiably been aimed at summarising and systematising existing knowledge. This could facilitate the conduct of original, well planned, primary studies of sufficient size to provide ‘new knowledge’ based answers to high priority, generally significant, public health questions. The authors of this review of reviews hope that it will help contribute to the identification of relevant questions for such studies, and the further creation of a culture that is unequivocally focused on excellence in the context of improving the public’s health in the most affordable and socially acceptable ways available.

APPENDICES

Appendix 1	The social determinants and economics of public health	116
Appendix 2	Critical Appraisal Tool	127
Appendix 3	Search strategy	129
Appendix 4	Report bibliography	131
Appendix 5	Flowchart of papers identified, received and screened	134
Appendix 6	Data extraction fields	135
Appendix 7	Evidence tables	136
Appendix 8	References of reviewed paper	180

APPENDIX 1: The social determinants and economics of public health

This Review is concerned with the impact of contextual factors on the effectiveness of interventions aimed at promoting health behaviour change. Hence it may be regarded as being based on a social-ecological model, which (as Figure A1 indicates) locates individuals and the choices they make within a framework of interpersonal, institutional, community and wider societal relationships, values and material constraints. (See, for instance, Gregson et al 2001). A number of key background and methodological points are considered in the initial Sections of the main report. Here additional remarks are offered on characteristics and concepts such as age, gender, ethnicity and social and economic positioning relate to life style choices, and the application of health economic techniques to the evaluation of interventions intended to change health behaviours.

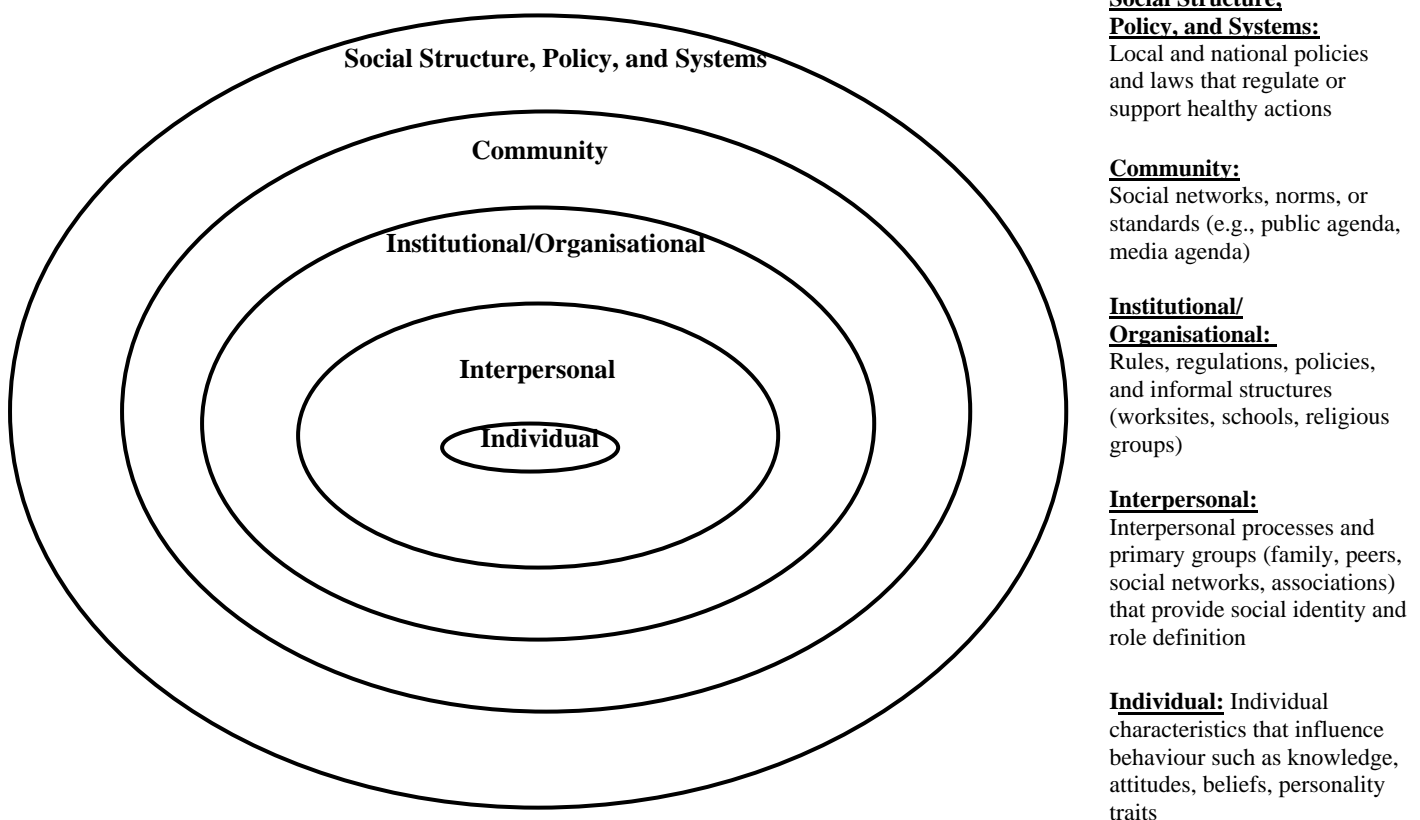


Figure A1.1. A Social-Ecological Model for nutrition evaluation: spheres of influence
Source: Gregson et al. 2001

A.1 Smoking, health and class

Tobacco smoking in the United Kingdom has been estimated to be responsible for in excess of 50 per cent of the differences in premature mortality between more and less advantaged social groups (Jarvis and Wardle 2005). Although some commentators may believe this to exaggerate the actual contribution of smoking to health inequalities (Marmot 2006) the habit is unquestionably hazardous and is currently at least two or three times as prevalent in less affluent and educated groups in England as it is amongst the better off. This is illustrated by the fact that 30 per cent of pregnant women in the economically least advantaged quartile of the population continue to smoke, compared to only 15 per cent of their peers in the most advantaged quartile. This is likely to have immediate and longer-term health consequences for the women concerned and their babies.

Reducing the prevalence of smoking therefore remains a key public health priority amongst all socio-economic groups. However, it is important not to take a simplistic view regarding how this should be achieved, or the extent to which individuals ought to be judged as irresponsible if they do not behave in ways that others consider best for their health.

For example, social disadvantage and smoking have not always be directly linked. At a population level tobacco use classically begins amongst rich, relatively advantaged, males and ends amongst poorer, relatively disadvantaged, females. While the smoking pandemic is relatively advanced in the UK, such initial patterns can still be seen elsewhere in the developing world and even in some EU member states. It is of note, for instance, that lung cancer rates in parts of Spain (lung cancer is a key tracer condition for tobacco related harm) are higher in better off, as opposed to less affluent, men and women (Mackenbach et al 2004).

Further relative reductions in smoking rates in the more advantaged sections of the UK population could well increase relative health inequalities, and hence might be seen as undesirable by some commentators. But such a trend, were it to occur, would not in absolute terms further disadvantage any group in society, and might in the long

term prove to be part of an overall trend that could ultimately result in the cessation of the smoking habit at a total population level.

The multiple social, economic and psychological determinants of public health act at a variety of levels over long periods, and on many occasions synergistically. Seen from this standpoint, they need to be understood comprehensively as dynamic as opposed to static phenomena, and not simply from the perspective of any one disciplinary perspective. Temporary increases in inequalities may on occasions be indicators of desirable progress. Similarly, it might also be argued that for individuals living in stressful or risky situations immediate behavioural 'rewards' are often more important than they are for those living in better – more secure and congenial – circumstances. The latter can (not least in economic terms) rationally afford to prioritise securing long-term rewards. The poor, by contrast, are more likely (rationally) to apply high discount rates.

Public health improvement programmes should of course attempt to protect individuals at the highest risk of smoking related or other causes of premature death and disability. But such observations serve as a reminder that individuals should not be unfairly blamed for living out the logic of their personal and group situations. Failures to recognise such points with due sensitivity, or to respect adequately the autonomy of individuals of all ages, could help to explain why on past occasions 'public health' messages and programmes have often been regarded with suspicion by many of the people they were designed to help (Mechanic 1999). They may also explain why approaches that focus on promoting informed behavioural choice without also seeking to modify the structural determinants of choice – the restraints and opportunities conferred via the social and economic contexts in which people live – may not prove to be as effective as their instigators intend.

A.2 *Social class and health*

Concepts such as social class should not be used in a simplistic, potentially counter-productive, manner. One obvious danger to avoid is that of over-generalising, and making false assumptions to the effect that all the members of large, and in some respects crudely defined, groups such as those which comprise the current NS

(National Statistics) Standard Occupational Classification are alike. In reality, health behaviour related characteristics may frequently be more usefully seen as being distributed on varying gradients across the whole population, rather than being clustered in one (in some respects purely constructed) 'class' as opposed to another (Graham and Kelly 2004). This is not least because the intervention needed to reduce social gradients may well differ markedly from those designed to 'lift' individuals from one class to another.

Understanding why harmful habits such as smoking, harmful alcohol consumption and/or excessive 'junk food' eating can be found in some members of all social classes can on occasions be as valuable as understanding why they may be more prevalent in the less protected/advantaged groups within a community (Blaxter 1990). At the same time, it is also important to recognise that alternative measures of social positioning or prestige (such as Cambridge scale, which provides a measure of general social advantage and is based on patterns of friendship between occupational groups' members – Blackburn and Prandy 1997) may sometimes have more potential to inform understanding of health behaviour variations than conventional materially based measures.

In contexts such as diet and smoking high Cambridge scale scores are strongly linked to healthier behaviour (Bartley et al 2000). But this relationship is not so robust in the case of sports participation. One interpretation of these data is that – at the current point in British history – visibly 'unhealthy' behaviours tend to serve (like trends in clothing fashion, musical taste, accent and manners) as identifiers of status and rank, at least as far as most members of the most successful – rational, and economically and politically dominant – section of the community is concerned.

It may be postulated that only the unusually confident amongst that latter are likely to feel able, should they wish it, to ignore such signalling systems. By contrast in other groups (including young people at the borderline between dependence and independence) visible habits such as smoking may still serve as markers of membership, and shared values and identities. Such possibilities suggest that as societies become more affluent, and their members awareness of need rises from basic

to more sophisticated levels, their value and stratification systems may change radically. This will create new contextual influences on health behaviours.

A.3 Gender and health

Since the 1840s, throughout the period of British history in which accurate records have been available, female life expectancy has consistently been greater than that of males, by an order of five or more years. This has in all probability been in part due to inherent biological variations (including, perhaps, factors relating to taking physical risks) and in part to social influences. For the purposes of this Review it is of note that gender related differences in areas such as alcohol and tobacco use and sexual risk taking appear presently to be reducing in the UK. At the same time trends such as increased suicide rates in young males seen during the 1990s might also have been linked to altered gender related role expectations and opportunities. Understanding the contextual drivers of such changes may have implications relevant to the current and future effectiveness of health behaviour change interventions.

A.4 Ethnicity and health

Nazroo (1998) has argued that ‘un-theorised ethnicity’ can lead to false assumptions that particular ethnic – or more crudely, racial – groups within a society are more or less disposed to given diseases or health conditions than others. Even when disease incidence and prevalence rates differ markedly between ethnic groups, appropriate analyses might show that (when the relevant figures standardised for factors such as income or access to adequate housing or sports facilities) no inherent vulnerability in fact exists. An inadequate appreciation of this may perpetuate destructive forms of social division and exclusion, and fragment understanding of population health as a derivative of integrated society-wide values and functions.

This is not to deny that particular groups within the modern British community, such as people of South Asian, African, Afro-Caribbean or Irish origin may not have particular genetic and/or cultural characteristics and social situations (leading to, for example, experiences of social exclusion) that influence their vulnerability to given forms of mental or physical illness. For instance, literature examined in preparation

for this tertiary review is indicative of such phenomena in fields ranging from schizophrenia (in young Afro-Caribbeans) and depressive illness (in Irish adults, and young South Asian women) to stroke (in Afro-Caribbean adults) and diabetes and coronary heart disease (in older South Asian adults).

Validated epidemiological observations should inform public health strategies. Yet a significant proportion of the available US literature on ethnicity and health (which is often focused only on African-American experience) may be taken to illustrate the risks that ‘un-theorised’ analyses of ethnicity and health may create. On occasions health variations that might properly be seen as either generic functions of material and social inequality, or forms of discrimination and prejudice that are imbedded in the wider fabric of society, still appear to be interpreted as the characteristics of a particular ‘race’ that exist independently of the behaviours of the rest of the population (Williams et al 2003). Although the US has played a leading role in the latter field and is in overall terms much wealthier than Britain and the rest of Western Europe, it is relevant to note that in overall terms the health status of its population is relatively poor – see Banks et al 2006.

A.5 *Social capital and health*

Social capital theory can be linked to the concept of human capital. The definition and measurement of ‘social capital’ is a complex field (Swann and Morgan 2002, Morgan and Swann 2004). Different writers have used the term in health related and other contexts to refer to contrasting ideas. These range from the material and substantive resources (such as human contacts) available to members of communities or groups to features such as the extent to which trust and shared values exist between the actors in social networks, or a more formal system of care and support (Hawe and Shiell 2000).

It would be inappropriate to attempt here to discuss such issues in depth. Many authors have contributed to this area of debate, and the examination of the ways in which social and material factors influence pathological processes. For example, it has been argued by some American observers that loneliness (defined essentially in terms of living in unsupportive environments) may contribute to the genesis of cardiac

disorders. There is also an extensive literature on the interface between depression and schizophrenia and coronary heart disease and type 2 diabetes.

In Europe Lynch et al (1997) analysed Finnish experience, and found in the research context of a relatively small and stable town population that poverty and psychosocial deprivation in childhood were strongly associated with health endangering behaviours later in life. By contrast, researchers such as Wilkinson (1996, 2006) and Marmot (2004) have highlighted issues linked to relative as opposed to absolute income inequalities, and the apparent impact of social status and working life control variations on the incidence of CVD. This is observable even after known physical risk factors have been accounted for. (See, for example, *Cmnd 4386, Saving Lives: Our Healthier Nation*).

A.6 The economics of public health

The development of health economics in Britain in the 1960s and 1970s was strongly supported by the pharmaceutical industry, in large part in relation to efforts to encourage NHS and other health care providers to accept the costs of new medicines for the treatment of conditions such as arthritis and peptic ulcer disease. Governments seeking to contain health service costs, and focus health resource usage on those areas that generate the best returns, have also supported the ongoing development of health economics. Generic utility measures such as Quality Adjusted Life Years and techniques such as incremental cost utility analysis have gained a particular application in evaluating pharmaceuticals, together with surgical interventions like hip replacements and coronary artery bypasses in the NHS and elsewhere, through the pioneering work of agencies such as NICE (Williams 2004).

It is logical that public health intervention commissioners and practitioners should similarly wish to be able to use (health economic) techniques to evaluate the benefits and costs of health promotion programmes and allied interventions, both to help ensure adequate levels of investment in preventive activities and also to make sure that the resources available for public health improvement are used to optimal effect. However, there are a number of barriers to be overcome in achieving this goal (Akehurst 2006, Drummond 2006, Maynard 2006). It would be outside the scope of

this analysis to seek to discuss these in detail. But illustrations of the practical, theoretical and ethical issues to be considered in this context include the following:

- **inadequate data on the epidemiological impacts of health behaviour change and allied interventions and the difficulty of conducting randomised controlled trials of public health interventions.** Without robust figures on the effects of interventions health economic analyses cannot be undertaken. Modelling based on incomplete information may allow economists to project a range of possible outcomes and values that give policy makers an idea of the scale of the possible opportunities available in areas such as exercise and dietary improvement. But such speculative calculations are inevitably only of limited value, particularly in politically contentious areas;
- **the existence of complex synergies between public health interventions and secular trends.** These make causality difficult to attribute in relation to population level behaviour change, and can critically affect evaluations of interventional benefits. For example, if smoking cessation interventions are (perhaps simplistically) seen as being responsible, when they succeed in facilitating quitting, for the lifetime protection of former smokers from additional tobacco related harm then they are normally regarded as highly cost effective. But were they (perhaps more realistically) to be seen as accelerating social trends already in motion, and hence regarded as responsible for only a few years additional protection, then their apparent cost effectiveness would be significantly reduced;
- **inter-sectorial implications.** The costs and benefits of HBC and other public health interventions are incurred and enjoyed not just within the NHS, but in social care and many other parts of the economy. This has led some commentators to question the extent to which approaches based on, for example, affordability thresholds that may (or may not) appropriately be applied in relatively narrowly used areas of health specific technology development can coherently be used in fields which potentially effect the entire population. However, in this context it may be noted that the presently accepted application of incremental cost utility analysis to areas drug use also normally fails to take into account wider

externalities and inter-sectorial impacts, such as family welfare gains and the employment consequences of pharmaceutical industry financial successes;

- **the use of QALY's as a measure of population level health and welfare gains.** Following on from the above, the instruments used to measure QALY values may from a practical perspective be difficult to apply in fields which extend beyond immediate health risk factor reduction for individuals, into positive community health promotion and the evaluation of interventions aimed at changing, rather than supporting the expression of, individual and group preferences. One ethical consideration linked to this last is that people in different social situations may rationally wish to apply different 'personal discount rates' to the costs and benefits of changing life styles, and extending their chances of living longer. Some people may have good reason to delay reward taking, while others may have good reasons to take more immediate gains. Aggregating such preferences in the field of public health has potential implications that are not necessarily relevant to pharmaceutical care option appraisals. It might, for instance, risk imposing 'white middle class values' on other minority groups. At a macro economic level the issue of discounting public health improvement gains also raises complex considerations as to the long term direction that society should seek to take, and the extent to which the present population should be prepared to invest in future generations' health; and
- **equity versus efficiency in the public health arena.** Tensions potentially exist between the policy objective of equalising the health of all members of a population and that of maximising its rate of health improvement, and its members' average life expectancy figures. Differences in the ways health economic calculations are undertaken in, for example, the US as opposed to the UK, may on occasions reflect such factors, and the contrasting values of different social groups. Such problems raise questions about, for example, the evaluation of public health evaluations that advantage well educated and/or intellectually able individuals more than others.

It therefore seems unlikely that public health evaluation techniques precisely comparable to those currently used to decide whether, and to what extent, health care funders should be prepared to buy new medicines will emerge in the foreseeable future. Yet suggesting this does not imply that a further application of economic theory and method public health policy making and relative impact measurement will not bring additional benefits, particularly if this is combined with better biomedical, epidemiological, psychological and sociological appreciations of the motors and mechanisms of health behaviour change.

References

Akehurst, R. 2006, Personal communication

Banks, J., Marmot, M., Oldfield, Z. & Smith, J.P. 2006, "Disease and disadvantage in the United States and in England", *Journal of the American Medical Association*, vol. 295, no.17, pp. 237-245.

Bartley, M., Sacker, A., Firth, D. & Fitzpatrick, R. 2000, Dimensions of inequality and the health of women In Graham H. (Ed) *Understanding health inequalities*, Buckingham: Oxford University Press.

Blackburn, R.M. & Prandy, K. 1997, "The reproduction of social inequality" *Sociology*, vol.31, pp.491-509.

Blaxter M. 1990, *Health and Lifestyles*, London: Routledge.

Cmnd 4386. 1998, *Saving lives: our healthier nation* London: Stationary Office.

Drummond, M. 2006, Personal communication

Graham, H. & Kelly, M. 2004, *Health inequalities: concepts, frameworks and policy*. London: Health development agency.

Gregson, J., Foerster, S.B., Orr, R., Jones, L., Benedict, J., Clarke, B., Hersey, J., Lewis, J. & Zotz, K. 2001, "System, environmental, and policy changes: using the social-ecological model as a framework for evaluating nutrition education and social marketing programs with low income audiences", *Journal of nutrition education*, vol. 33, supplement 1, pp. s4-s15.

Hawe, P. & Shiell, A. 2000, "Social capital and health promotion: a review", *Social science and medicine*, vol.51, pp.871-875.

Jarvis M. J. & Wardle, J. 2005, Social patterning of health behaviours: the case of cigarette smoking. In: Marmot M. & Wilkinson R. (eds) *Social Determinants of Health*. Oxford: Oxford University Press, 2nd edition.

Lynch, J., Kaplan, G.A. & Salonen, J.T. 1997, "Why do poor people behave poorly? Variation in adult health behaviours and psychological characteristics by stages of the socio-economic life course", *Social science and medicine*, vol. 44, no.6, pp.809-819.

Mackenbach, J.P., Huisman, M., Andersen, O., Bopp, M., Borgan, J.K. et al. 2004, "Inequalities in lung cancer mortality by the educational level in ten European populations" *European Journal of Cancer*, vol. 40, pp.126-135.

Marmot M. 2004, *The Status Syndrome: How Social Standing Affects Our Health and Longevity*. London: Bloomsbury Publishing.

Marmot M. 2006, "Smoking and inequalities" *Lancet*, vol.368, pp. 341-342.

Maynard A. (2006) Personal communication

Mechanic, D. 1999, "Issues in promoting health", *Social Science and Medicine*, vol. 48, pp.711-718.

Morgan, A. & Swann, C. (Eds) 2004, *Social capital for health: Issues of definition, measurement and links to health*, London: Health Development Agency.

Nazroo, J.Y. 1998, "Genetic cultural or socio-economic vulnerability? Explaining ethnic inequalities in health", *Sociology of health and illness*, vol. 20, no. 5, pp. 710-730.

Swann, C. & Morgan, A. (Eds) 2002, *Social capital for health: Insights from qualitative research*, London: Health Development Agency.

Wilkinson, R. 1996, *Unhealthy Societies: The Afflictions of Inequality*. London: Routledge.

Wilkinson, R. 2006, Personal communication

Williams, A. 2004, *What could be nicer than NICE?* London: Office of Health Economics.

Williams, D.R., Neighbors, H.W. & Jackson, J.S.2003, "Racial/ethnic discrimination and health: findings from community studies", *The American public health association*, vol. 93, no.2, pp.200-208.

APPENDIX 2: Critical Appraisal Tool

Ref:

Authors _____

Year of publication _____

Title _____

Source _____

Form completed by _____ **Date** _____

Relevance to topic			
Does this paper address your topic area?	Yes	No	
Unsure			
Selection Criteria			
Did the paper have a clearly focussed aim or research question?	Yes	No	Unsure
Consider whether the following are discussed:	Yes	No	Unsure
• The population studied	Yes	No	Unsure
• The interventions given	Yes	No	Unsure
• The outcomes considered	Yes	No	Unsure
• Inclusion and exclusion criteria	Yes	No	Unsure
• Types of studies	Yes	No	Unsure
Did the paper consider inequalities?	Yes	No	Unsure
Systematicity			
Do the reviewers include all:			
a) Relevant databases searched	Yes	No	Unsure
b) Years searched	Yes	No	Unsure
c) Were references from bibliographies followed up?	Yes	No	Unsure
d) Were experts consulted?	Yes	No	Unsure
e) Was grey literature searched?	Yes	No	Unsure
f) Were search terms specified?	Yes	No	Unsure
g) Is the search strategy adequate?	Yes	No	Unsure
h) Did the review include English language studies only?	Yes	No	Unsure
Is it worth continuing?	Yes	No	
Why/why not?			

Quality			
Did the authors assess the quality (rigour) of the included studies?	Yes	No	Unsure
Consider whether the following are used:	Yes	No	Unsure
<ul style="list-style-type: none"> ▪ A rating system ▪ More than one assessor 	Yes	No	Unsure
If study results have been combined, was it reasonable to do so?	Yes	No	Unsure
Consider whether the following are true:	Yes	No	Unsure
<ul style="list-style-type: none"> • Are the results of included studies clearly displayed? • Are the studies sufficiently similar in design? • How were the variations between studies investigated? 	Yes	No	Unsure
Are there sufficient data to support conclusions?	Yes	No	Unsure
Relevance to UK			
Can the results be applied/are generalisable to a UK population/ population group?	Yes	No	Unsure
<ul style="list-style-type: none"> ▪ Are there differences in health care provision with the UK? ▪ Is the paper focused on a particular target group (age, sex, population sub-group etc)? 	Yes	No	Unsure
Accept for inclusion?	Yes	No	Refer to third party
Additional comments:			

APPENDIX 3: Search strategy

The search strategy below was used for Medline. This core strategy was adapted for the other databases searched.

MEDLINE (Dialog Datastar)

Date searched: 17th January 2006

1. BEHAVIOUR ADJ CHANGE
2. BEHAVIOR ADJ MODIFICATION
3. HEALTH ADJ BEHAVIOR
4. HEALTH-BEHAVIOUR-EH.DE.
5. HEALTH ADJ KNOWLEDGE
6. HEALTH-KNOWLEDGE-ATTITUDES-PRACTICE#.DE.
7. HEALTH ADJ ATTITUDES
8. ATTITUDE-TO-HEALTH-EH#.DE.
9. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8
10. DEVELOPMENTAL ADJ STAGES
11. LIFE ADJ STAGES
12. LIFE-CHANGE-EVENTS#.DE.
13. LIFE ADJ CHANGES
14. PERSONALITY-DEVELOPMENT#.DE.
15. ADOLESCENT-DEVELOPMENT#.DE.
16. CHILD-DEVELOPMENT#.DE.
17. ADOLESCENT-PSYCHOLOGY#.DE.
18. ADOLSCENT-BEHAVIOR#.DE.
19. PUBERTY#.W..DE.
20. CHILD-BEHAVIOR#.DE.
21. MARRIAGE#.W..DE.
22. PARENTING#.W..DE.
23. DIVORCE#.W..DE.
24. MENOPAUSE#.W..DE.
25. PREGNANCY
26. PREGNANCY#.W..DE.
27. 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21
OR 22 OR 23 OR 24 OR 25 OR 26
28. SMOKING ADJ CESSATION
29. SMOKING-CESSATION#.DE.
30. SMOKING-PC#.DE.
31. TOBACCO-USE-DISORDER-PC#.DE.
32. EXERCISE
33. EXERCISE#.W..DE.
34. PHYSICAL ADJ ACTIVITY
35. DIET
36. DIET#.W..DE.
37. NUTRITION
38. NUTRITION.DE.
39. 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38
40. PT=META-ANALYSIS
41. PT=REVIEW
42. (META ADJ ANALYSIS). TI, AB.
43. REVIEW.TI,AB.
44. 40 OR 41 OR 42 OR 43
45. PT=COMMENT

- 46. PT=LETTER
- 47. 45 OR 46
- 48. 44 NOT 47
- 49. 9 AND 27 AND 39 AND 48

APPENDIX 4: Report bibliography

Acheson, D. 1998, *Independent Inquiry into Inequalities in Health Report*, London: The Stationary Office.

Adshead, F. 2006, Social marketing principles, 26th July 2006. <http://www.number-10.gov.uk/output/Page9913.asp> [Last accessed August, 14th 2006].

Alberti, K.G.M.M. 2006, Personal communication.

Banks, J., Marmot, M., Oldfield, Z. & Smith, J.P. 2006, "Disease and disadvantage in the United States and in England", *Journal of the American Medical Association*, vol. 295, no.17, pp. 237-245.

Batty, G.D., Der, G., Macintyre, S., Deary, I.J. 2006, "Does IQ explain socio-economic inequalities in health? Evidence from population based cohort study in the West of Scotland", *British Medical Journal*, vol. 332, pp. 580-583.

Belza, B. & Warms, C. 2004, "Physical activity and exercise in women's health", *Nursing clinics of north America*, vol. 39, pp. 181-193.

Blair A. 2006, Speech on Healthy Living, 26th July 2006. <http://www.number-10.gov.uk/output/Page9921.asp> [Last accessed July 29th, 2006].

Blaxter M. 1990, *Health and Lifestyles*, London: Routledge.

Calnan, M. 1994, Lifestyle and its social meaning In Albrecht, G. (Ed) *Advances in medical sociology*, Greenwich: JAI Press.

Cater, S. & Coleman, L. 2006, *'Planned' teenage pregnancy: Views and experiences of young people from poor and disadvantaged backgrounds*, Bristol: The Policy Press.

Cmnd 6374. 2004, *Choosing health: making healthy choices easier*, London: The Stationery Office.

Cochrane injuries group driver education reviewers. 2001, "Evidence based road safety: the driving standards agencies schools program", *Lancet*, vol. 358, pp.230-232.

Drever F. and Whitehead M. (Eds) 1997, *Health Inequalities*, London: The Stationery Office.

Gatrell, A., Thomas, C., Bennett, S., Bostock, L., Popay, J., Williams, G. & Shahtahmasebi, S. 2000, Understanding health inequalities: Locating people with geographical and social spaces In Graham H. (Ed) *Understanding health inequalities*, Buckingham: Oxford University Press.

Graham, H. (Ed) 2000, *Understanding health inequalities*, Buckingham: Oxford University Press.

Hillsdon, M. & Thorogood, M. 1996, "A systematic review of physical activity promotion activities", *British Journal of Sports Medicine*, vol. 30, pp. 84-89.

Kessel, A. 2006, *Air, the environment and public health*, Cambridge: Cambridge University Press.

Khaw, K.T., Bingham, S., Welch, A., Luben, R., Wareham, N., Oakes, S. & Day, N. 2001, "Relation between plasma ascorbic acid and mortality in men and women in EPIC-Norfolk prospective study: prospective population study" *Lancet*, vol. 357, pp.657-663.

Khaw, K.T., Jakes, R., Bingham, S., Welch, A., Luben, R., Day, N. and Wareham, N. 2006, "Work and leisure time physical activity assessed using a simple, pragmatic, validated questionnaire and incident cardiovascular disease and all course mortality in men and women: the European prospective investigation into cancer in Norfolk prospective population study", *International Journal of Epidemiology*, May 18th 2006 (online copy read ahead of publication).

Kramer, M.S. 2002, *Aerobic exercise for women during pregnancy*. The Cochrane database of systematic review, issue 2.

Lange-Collett, J. 2002, "Promoting health among perimenopausal women through diet and exercise", *Journal of the American academy of nurse practitioners*, vol. 14, no.4, pp.172-177.

Mackenbach, J.P., Huisman, M., Andersen, O., Bopp, M., Borgan, J.K. et al. 2004, "Inequalities in lung cancer mortality by the educational level in ten European populations" *European Journal of Cancer*, vol. 40, pp.126-135.

Marmot M. 2005, Personal communication.

Marmot M. 2006, "Smoking and inequalities" *Lancet*, vol.368, pp. 341-342.

Matrix. 2005, *Rapid review of the economic evidence of physical activity interventions* London: National Institute for health and clinical excellence.

Mayo, E. 2006, Social marketing/changing behaviour 26th July 2006. <http://www.number-10.gov.uk/output/Page.9910.asp> [Last accessed August,14th 2006].

Mechanic, D. 1995, "Sociological dimensions of illness behaviour", *Social Science and Medicine*, vol. 41, no.9, pp. 1207-1216.

National Institute for Health and Clinical Excellence. 2006, *NICE Public health guidance methods manual* London: National Institute for Health and Clinical Excellence.

Nicklas, T.A., Baranowski, T., Baranowski, J.C., Cullen, K., Rittenberry, M.S. & Olvera, N. 2001, "Family and child care provider influences on pre-school children's fruit, juice, and vegetable consumption", *Nutrition reviews*, vol. 59, no.7, pp.224-235.

Oliver A., Healey A. and Le Grande J. 2002, "Addressing Health Inequalities", *Lancet*, vol. 360, pp 565-567.

Rowntree, B. S., 1901, *Poverty: A Study of Town Life*, London:Macmillan.

Scottish Intercollegiate Guidelines network. 2002, *SIGN 50. A guideline developers handbook*, Edinburgh: Scottish Intercollegiate Guidelines network.

Suhrcke, M., McKee, M., Sauto Arce, R., Tsoolova, S. & Mortensen, J. 2005, *The Contribution of Health to the economy in the European Union*. Luxembourg: Office for Official Publications of the European Communities.

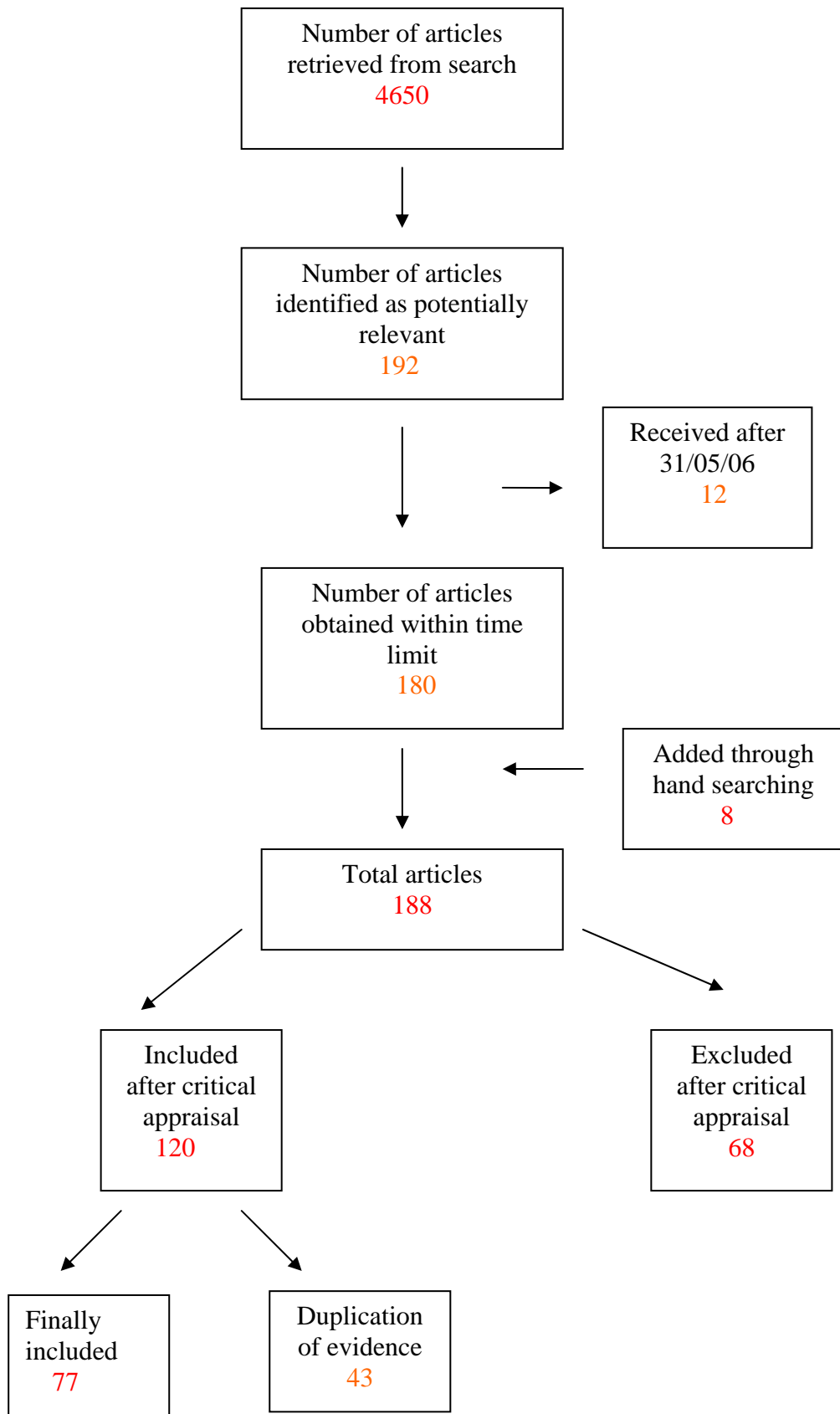
Taylor, D. & Bury, M. 2006, "A theory of care transition: from medical dominance to managed consumerism in ageing societies" (*in preparation*)

Taylor, D., Bury, M., Campling, N., Carter, S., Garfield, S., Newbould, J. & Rennie, T. (2006) *A review of the use of the health belief model, the theory of reasoned action, the theory of planned behaviour and the transtheoretical model to study and predict health related behaviour change*. London: National Institute for health and clinical excellence (*under review*).

Wanless, D. 2004, *Securing good health for the whole population*, London: HM Treasury.

Wilcox, S. 2002, "Physical activity in older women or color" *Topics in geriatric rehabilitation*, vol. 18, no. 1, pp. 21-33.

APPENDIX 5: Flow chart of papers identified, received and screened



APPENDIX 6: Data extraction fields

Reference ID	Data extracted by	Date of extraction
Author(s)	Year	
Title		
Source		
Type of study		
Research question(s)		
Databases/sources searched		
Years searched		
Inclusion criteria		
Exclusion criteria		
Number of studies		
Number of participants		
Method of analysis		
What data extracted?		
Results		
Conclusions		
Criticism of conclusions?		
Evidence of effect in sub-groups?		
Strengths/weaknesses of the evidence		
Results generalisable to the UK?		
Recommendations for future research		
Cost-effectiveness data		
Policy implications		
Implications for practice		
Comments		

APPENDIX 7: Evidence tables

Author and date	Review type and quality	Study population	Research question(s)	Main results	Applicability to UK
Academic and Public Health Consortium 2005	<p>Systematic review (including at least one RCT)</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: Review of effectiveness – 38 reviews, 31 trials and 11 studies regarding barriers to implementation; economic review – 24 studies</p>	Smokers, particularly pregnant smokers and disadvantaged groups	What is the effectiveness of brief interventions and referrals for smoking cessation, and what is their cost effectiveness?	<p>Several types of brief interventions show some efficacy. Evidence supports the efficacy of physician advice giving routine brief intervention for smoking cessation and nurse advice as a brief structured intervention only. The estimated effect size for physician advice is in the region of 2%. There is insufficient evidence to determine the efficacy of brief interventions from other HCPs. There is insufficient evidence to determine the efficacy of brief interventions offered through the workplace, A&E departments, or to adolescents/students or smokeless tobacco users. There is no evidence for efficacy of brief behavioural interventions to hospital inpatients, or delivered as part of routine care for pregnant smokers, or for brief family and carer interventions to decrease children’s exposure to environmental tobacco smoke. Evidence supports the efficacy of NRT as part of a brief intervention for smokers wishing to make a quit attempt. Evidence also supports the limited efficacy of individually tailored materials. There is some evidence to support the efficacy of telephone help lines. There is mixed evidence to support using a stages of change based approach and insufficient evidence to determine the efficacy of brief multi-component interventions or the use of biological measures of risk or exposure. There is evidence that extending the time spent in providing a brief intervention may slightly augment the effect on quitting. Concerning the smoker’s characteristics, there is insufficient evidence to determine the influence of having had a previous brief intervention, or to determine whether the number of previous quit attempts affects a smoker’s response to a brief intervention. There is evidence indicating that brief interventions, especially if they do not include pharmacotherapy, are probably less effective for more dependent smokers. Many smokers in disadvantaged groups will be more dependent and have other characteristics predicting difficulty in stopping smoking. There is some evidence to suggest that the main barriers to brief interventions being delivered are lack of time, believing that the intervention is not effective, lack of reimbursement, lack of skills, training or confidence and a fear that it might alienate patients. Combinations of provider training and reminder systems can increase the provision of advice and patient</p>	<p>5 of the economic review studies UK based, no data for effectiveness review.</p> <p>Relevance score: A</p>

				cessation rates but there is insufficient evidence to determine the effect of incentive payments to health care providers on either intervention delivery or smoking behaviour.	
Ammerman A et al 2001	<p>Systematic review (including at least one RCT)</p> <p>Level: 1</p> <p>Review quality: +</p> <p>No. of studies: 92</p>	Generally healthy adults, adolescents and children; as well as individuals at elevated risk of, or diagnosed with, cancer, heart disease or Type 2 diabetes (interventions of all types)	<p>Is there evidence that one type of intervention or combination of interventions is more effective than another in helping individuals increase their fruit/vegetable intake or reduce their fat intake? What is the evidence for the efficacy of dietary interventions by population sub-group, particularly ethnicity and gender?</p> <p>What conclusions can be reached about the cost-effectiveness of these interventions?</p>	<p><u>Fruit & vegetable intake</u> 39 studies reported fruit/vegetable intake. A standardised quantitative analysis indicated that dietary interventions were positively associated with changes in fruit/vegetable intake, and that when measured separately, changes in fruit intake were larger than vegetable. 16 of 22 studies reported statistically significant increases in fruit/vegetable (as a combined outcome). The standardised quantitative analysis translated this as an average increase of 0.6 servings/day. The review analysis suggested that interventions were more successful at increasing fruit intake among children, and vegetable intake among adults. Also, interventions conducted among higher disease-risk populations were consistently more likely to report statistically significant increases in fruit & vegetable intake than studies in general populations. Studies employing a theoretical basis (14/16 studies) were more likely to report statistically significant increases in fruit & vegetable intake than studies that did not utilise theory (3/6 studies). The use of social support components was associated with more favourable increases in fruit/vegetable intake.</p> <p><u>Dietary fat intake</u> 80 studies reported dietary fat intake. Overall, dietary interventions were associated with change in fat consumption. There were similar decreases in total and saturated fat intake (the two most commonly reported fat outcomes). The median difference between intervention and control groups in the change in total fat intake (as a % of total energy intake) was -15.7% (= 7.3% reduction in percentage calories from fat). A subset of studies also measured blood cholesterol: decreases in total fat intake (but not saturated fat intake) were significantly correlated ($r=0.76$) with concomitant decreases in blood cholesterol. Although studies conducted in high-risk populations were not consistently more likely to report a statistically significant decrease in fat intake, the magnitude of change in those interventions, and the median difference in outcome between intervention and control groups in those interventions (-29.3% and -14.5% respectively for saturated fat), were notably higher than in interventions involving general risk populations. Interventions conducted among children appeared to be more successful at reducing intake of total fat and less successful at reducing intake of</p>	<p>Non-UK studies but no apparent reason why they should not be relevant to the UK.</p> <p>Relevance score: B</p>

				<p>saturated fat than interventions among adults (although this was a very small number of studies).</p> <p>Interventions employing a theoretical framework were not consistently more likely to report significant effects.</p> <p>The use of social support, small groups and goal setting appeared particularly effective at reducing fat intake.</p> <p>Studies involving families and using interactive food-related activities were more likely to report significant decreases in fat intake, although magnitude of decrease was not higher.</p> <p>All 5 of the studies which were designed to be culturally or ethnically specific reported significant decreases in total and saturated fat intake.</p>	
Ammerman A et al 2002	<p>Three tier analytic approach (inc. meta-analysis) – RCTs and non-RCTs</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 92</p>	Healthy adult or at risk populations	<p>What is the overall effectiveness of behavioural dietary interventions in promoting dietary change related to chronic disease risk reduction?</p> <p>What is the relative effectiveness of specific intervention features among different population sub-groups?</p>	<p><u>Meta-analysis</u>; studies typically showed small to moderate changes in the intervention group that were significantly larger than in the comparison group. However, the magnitude of effects varied by setting and population and by the length and intensity of the intervention.</p> <p>Interventions appeared more successful at changing dietary behaviour among populations at risk (or diagnosed with) disease more than among general healthy populations.</p> <p><u>Differences in deltas analysis</u>; dietary interventions were similarly successful in reducing intake of total and saturated fat, and increasing fruit and vegetable intake. There was an average decrease of 7.3% of daily calories from fat. Amongst fruit and vegetable studies included in differences in delta analysis intervention groups increased their intake of fruit and vegetables about 17% more than control groups. This represents an average increase of 0.6 servings of fruits and vegetables per day.</p> <p><u>Summary of significant findings approach</u>; the majority of studies (n=49) reported significant intervention effect for changes in dietary intake. 86% of the studies found significant effect in terms of reduction in total fat, 87% of studies found significant effect in reducing saturated fat intake and 77% of studies found a significant effect in increasing fruit and vegetable intake.</p> <p><u>General results</u>; interventions with younger people (less than 18 years) were more likely than those with adults, although the opposite was true for the intake of saturated fat. Two intervention components appeared successful at modifying dietary behaviour – goal setting and small groups.</p>	<p>Unable to ascertain if review included studies from the UK.</p> <p>Relevance score: B</p>
Ashenden R, Silagy C &	Systematic review (including at least one	Adults attending general practice	In relation to four behaviours (smoking,	<u>Smoking cessation</u> : Provision of brief or intensive advice increases the odds of quitting (OR: 1.32, CI: 1.18 – 1.48). Number of smokers needed	Studies from the UK were represented in the

Weller D 1997	<p>RCT)</p> <p>Level: 1</p> <p>Review quality: +</p> <p>No. of studies: Smoking - 23 trials, diet – 10 trials, exercise – 6 trials</p>		<p>alcohol consumption, diet, and exercise): Is the provision of advice more effective in eliciting lifestyle-related behaviour change than providing no advice? Is providing intense advice more effective than brief advice?</p>	<p>to treat to produce one quitter: 50 with brief advice, 25 with intensive advice. However, a direct comparison between intensive and brief advice (n=6275) found no statistical difference (OR: 1.07, CI: 0.88 – 1.29). <u>Diet</u>: Evidence variable, no conclusions drawn. <u>Exercise</u>: Evidence variable, no conclusions drawn. However, evidence in three of the six trials demonstrating short- and long-term effects.</p>	<p>review (7 smoking, 3 diet, 2 exercise).</p> <p>Relevance score: A</p>
Ashworth NL et al 2005	<p>Systematic review (RCTs and quasi-RCTs)</p> <p>Level: 1</p> <p>Review quality: ++</p> <p>No. of studies: 6</p>	<p>Older adults (50 years or over), with either a recognised cardiovascular risk factor, or existing cardiovascular disease, or chronic obstructive airways disease or osteoarthritis</p>	<p>What is the effectiveness of home based versus center based physical activity programs on the health of older adults?</p>	<p>224 participants received a home based exercise programme and 148 received a center based exercise programme. <u>Cardiovascular</u>: the largest trial (accounting for approximately 60% of the participants) looked at sedentary older adults. 3 trials looked at patients with peripheral vascular disease (intermittent claudication). In patients with peripheral vascular disease center based programmes were superior to home at improving distance walked and time to claudication pain at up to 6 months. However the risk of a training effect may be high. There were no longer term studies in this population. Notably home based programmes appeared to have a significantly higher adherence rate than center based programmes. However this was based primarily on the 1 study (with the highest quality rating of the studies found) of sedentary older adults. This showed an adherence rate of 68% in the home based programme at 2 year follow-up compared with 36% adherence in the center based group. There was essentially no difference in terms of treadmill performance or cardiovascular risk factors between groups. <u>COPD</u>: 2 trials looked at older adults with COPD. In patients with COPD the evidence is conflicting. 1 study showed similar changes in various physiological measures at 3 months that persisted in the home based group up to 18 months but not in the center based group. The other study showed significantly better improvements in physiological measures in the center based group after 8 weeks but again the possibility of training effects is high. <u>Osteoarthritis</u>: no studies were found.</p>	<p>4 of the 6 studies performed in the US, 1 in Spain, and the country of origin for the final trial not stated.</p> <p>Relevance score: B</p>
Bessell T L 2002	<p>Systematic review (including at least one RCT)</p>	<p>Internet users, non-Internet users and other communications media users and non-</p>	<p>What is the effect of consumer use of online health information on decision-making,</p>	<p>Only 6 of the 10 studies were deemed good quality. 1 showed the Internet to be an effective medium to deliver a smoking cessation programme (52% of smokers had quit 12 months after enrolling on online programme). 3 other studies all showed positive outcomes of</p>	<p>Non-UK studies. Majority of studies in the review were US based.</p>

	<p>Level: 1</p> <p>Review quality: -</p> <p>No. of studies: 10</p>	users	attitudes, knowledge, satisfaction and health outcomes and utilisation?	Internet interventions, one of which showed significant reductions in fast food calories and fat and more fruit/vegetable intake in internet + classroom intervention compared to classroom intervention in a poor US school (though 'change' was reported in points, so cannot determine real extent of change). Another study compared a 6-month internet-based weight loss programme + additional resources such as email lessons, support and bulletin board with an internet-based programme only, in overweight US employees. The former intervention showed better weight loss. [The sixth study looked at attitudes towards surgery]. The 4 poorer quality studies, did not address dietary, smoking or exercise behaviour.	Relevance score: B
Bize R et al 2005	<p>Systematic review (of RCTs)</p> <p>Level: 1</p> <p>Review quality: +</p> <p>No. of studies: 8</p>	Smokers	What is the efficacy of providing smokers with feedback on their exhaled carbon monoxide (CO) measurement, spirometry results, and genetic susceptibility to smoking-related diseases in helping them to quit?	1 of the 8 trials used CO alone and CO + genetic susceptibility as 2 different intervention groups, giving rise to 3 possible comparisons. 3 of the trials isolated the effect of exhaled CO on smoking cessation rates resulting in the following odds ratios (ORs) and 95% confidence intervals (CI): 0.73 (0.38-1.39), 0.93 (0.62-1.41), and 1.18 (0.84-1.64). Combining CO measurements with genetic susceptibility gave an OR of 0.58 (0.29-1.19). Exhaled CO measurement and spirometry were used together in 3 trials, resulting in the following ORs (CI): 0.6 (0.25-1.46), 2.45 (0.73-8.25), and 3.50 (0.88-13.92). Spirometry results alone were used in 1 other trial with an OR of 1.21 (0.60-2.42). 2 trials used other motivational feedback measures, with an OR of 0.80 (0.39-1.65) for genetic susceptibility to lung cancer alone, and 3.15 (1.06-9.31) for ultrasonography of carotid and femoral arteries performed in light smokers (average 10 to 12 cigarettes a day). The therapist delivering the intervention was a physician in 3 trials, a nurse in 2 trials, or a specific study staff member in 3 trials.	<p>Reviewed 2 UK based studies</p> <p>Relevance score: A</p>
Blenkinsopp A, Anderson C & Armstrong M 2003	<p>Systematic review (including at least one RCT)</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 5 – 2 RCTs and 3 non-randomised studies</p>	Not stated	What is the peer-reviewed evidence relating to the impact of community pharmacy activity in the reduction of risk behaviours and risk factors for coronary heart disease?	This study described three areas of community pharmacy heart disease prevention – smoking cessation, lipid management, and case-finding [of which smoking cessation is appropriate to this review]. <u>Smoking cessation</u> : Results describe 2 RCTs which are also described in a Cochrane review (Sinclair, H. K., Bond, C. M., & Stead, L. F., 2004). In addition to the general results of those two studies, two further studies conducting health economic analysis of them, are also commented on: Study 1 - Cost saving of producing one successful attempt to quit smoking by using intensive rather than standard pharmaceutical support = £300 or £83 per life year (no indication as to the distinction between the two savings). Study 2 - {Analysis of pilot study} Cost per life year saved ranged; For men: £196.76 - £351.45, women: £181.35 - £722.	<p>Both smoking cessation RCTs and economic analyses were conducted in the UK.</p> <p>Relevance score: A</p>

				These findings demonstrate significant economic savings of community pharmacy interventions in smoking cessation, where conclusive evidence of effectiveness is limited.	
Blue CL & Conrad KM 1995	Systematic review (including at least one RCT) Level: 2 Review quality: - No. of studies: 10	Adults (undergoing worksite exercise programmes and specific strategies to improve exercise adherence)	What effect do worksite exercise interventions that seek to increase adherence to exercise have?	9 of the 10 included studies showed that exercise adherence strategies worked to increase or improve exercise behaviour. The most impressive results came from programmes with multiple interventions. Long term outcomes were only assessed in a minority of studies. However, one study examined data adherence over 12 years and found a 'dropping off' of adherence to exercise over time. Another study measuring short term outcomes only indicated that relapse training may reduce 'dropping off.'	Review does not state which countries studies were carried out in. Relevance score: B
Brunner E J et al 2005	Systematic review (RCTs and quasi-RCTs) Level: 1 Review quality: ++ No. of studies: 29	Individuals over the age of 19 years (<25% of participants in any trial had diagnosed cardiovascular disease at recruitment)	What are the effects of providing dietary advice for obtaining sustained desirable dietary changes or improvement in cardiovascular risk profile among healthy adults?	<u>Blood pressure and urinary sodium:</u> SBP was reduced by 2.10mmHg, (95% CI -2.83 to -1.37) and diastolic blood pressure by 1.63mmHg (95% CI -2.71 to 0.56). Urinary sodium output was reduced by 44.2mmol/24 hours (95% CI -54.7 to 33.6). <u>Blood lipids:</u> There was a small but significant reduction in total cholesterol of 0.13mmol/L (95% CI -0.23 to 0.03). There was a similar reduction in LDL of 0.13mmol/L (95% CI -0.25 to 0.01). There was no effect on HDL cholesterol. TGL (blood serum triglyceride) levels were reported in one study which found no intervention effect. <u>Dietary fat and dietary saturated fatty acids:</u> Total dietary fat intake expressed as a percentage of total calories as reduced by 6.18 % (difference in means -6.18%, 95% CI -8.36 to 4). There was substantial heterogeneity (p<0.00001). Saturated fatty acid intake was reduced by 3.28% (difference in means -3.28%, 95% CI -4.64 to 1.92). There was heterogeneity (p= 0.00001). <u>Fruit and vegetables:</u> Combined fruit and vegetable intake increased by 1.24 servings (95% CI 0.43 to 2.05). There was heterogeneity (p=0.00001) with a large effect seen in individuals with increased risk of colorectal cancer. Three US trials with low income and blue collar participants obtained small increases in mean fruit and vegetable intake (0.24-0.43 servings per day). There was no significant overall intervention effect on fruit intake alone (difference in means 0.34, 95% CI -1.24,1.92). There was an intervention effect on vegetable intake alone (difference in means 0.82, 95% CI 0.19-1.45). <u>Dietary fibre:</u> Dietary fibre increased by 7.22g per day (95% CI 2.84 to 11.6). There was a heterogeneity with a large effect seen in individuals	The majority of trials were conducted in the USA but includes UK studies. Relevance score: A

				<p>with increased risk of colorectal cancer.</p> <p><u>Gender:</u> Women were more likely than men to report reduced dietary fat intake and increased fruit and vegetable intakes but no gender differences in total blood cholesterol. There were large intervention effects on fat intake in the 2 women's health trial pilot studies.</p> <p><u>Disease risk groups:</u> Participants at higher risk of cardiovascular disease did not report greater reductions in dietary fat intake or cholesterol level but those at high cancer risk had a substantially greater reported intake of fruit and vegetables.</p> <p><u>Intervention setting:</u> Trials conducted in healthcare settings tended to show greater reporting of reduced dietary fat and increased fruit and vegetable consumption than workplace/ community settings. However no differences in blood cholesterol reductions were found.</p> <p><u>Intervention intensity:</u> Overall high intensity interventions involving more than 3 scheduled contacts tended to be associated with larger effect sizes than low intensity interventions. The difference in effect size was significant for dietary fat and for fruit and vegetables, however there was heterogeneity in the effects within these high intensity subgroups. No differences in blood cholesterol reductions were found. There is therefore inconsistent evidence that higher intensity interventions are associated with larger dietary changes.</p>	
Brunton G et al 2003	<p>Systematic review (including at least one RCT)</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 5</p>	Children aged 4-10 years	<p>What is known about the barriers to, and facilitators of, physical activity beyond the PE lesson amongst children aged 4- 10?</p> <p>Are interventions taking place beyond the PE lesson effective for increasing the physical activity levels of children aged 4 to 10?</p> <p>What experiences/ideas do children and their parents have about the barriers to and facilitators of physical activity beyond the PE lesson?</p>	<p>All 5 methodologically sound studies were found to be effective in modifying one or more behavioral or motivational physical activity outcomes for children.</p> <p>A 3 year long, school-based programme approach that included classroom lessons, family involvement and modifications to PE lessons resulted in children spending more time in vigorous physical activity. This effect was still visible 3 years post intervention. However, there was no effect on physical activity self efficacy or perceptions of positive social support for physical activity.</p> <p>Children's participation in organised physical activity was influenced by an intervention initiated in a primary care clinic which combined 20 minutes of family training in use of an electronic TV monitor with access to a monitor for 4 weeks. However, there was no effect on hours spent watching TV and playing video games or the amount time children played outside. In addition, it was unclear whether the approach used was better than a counselling only session.</p> <p>In another study, children receiving the same type of TV monitor along with 6 months of classroom taught sessions on monitoring their own TV use, watched fewer hours of TV and played fewer video games per week.</p>	<p>All 5 studies were carried out in the USA.</p> <p>Relevance score: B</p>

			<p>To what extent do interventions build on these views? What do the above suggest for developing effective and appropriate interventions to be tested in the future?</p>	<p>They also decreased the number of meals they ate in front of the Tv. Two interventions combining teacher led sessions with parental involvement improved children's physical activity-related knowledge. One of these 2 studies also assessed physical activity levels and TV watching and did not find an intervention effect.</p> <p><u>Childrens' views:</u> Barriers: Not enjoying sport or exercise, physique, co-ordination skills not well suited to sports, shame/embarrassment, frustration with unclear/complex rules, boredom with particular sports, preference for other activities, lack of their own or parent's time, friends not interested in sports or exercise, parents lack of participation or enthusiasm for physical activity, costs, lack of transport to get to facilities, availability of local facilities, busy traffic, threat of crime, threat of intimidation by older children, parental restrictions, neglect of local play areas, recognising advantages of cars for enabling quick and efficient travel. Facilitators: Having fun and enjoying oneself, belonging to a sports team, sports providing opportunity to compete and achieve, opportunities for spending time with friends and/or family, keeping fit and healthy, weight control, way of forgetting troubles, choice of sporting opportunities, supportive, encouraging and inspiring family, practical support from parents, having a car, having a garden, better provision of youth clubs for children to meet, cleaning up park spaces and play areas, providing better cycle paths, more extra-curricula activities organised by schools, making school facilities more accessible outside of school lessons. The cost of taking part in sports or other activities were more likely to be identified by children and parents from families with lower incomes. Lack of transport and available facilities were more likely to be described by children living in rural areas.</p>	
Christakis D A et al 2003	<p>Systematic review (of RCTs)</p> <p>Level: 1</p> <p>Review quality: -</p> <p>No. of studies: 4</p>	Youths aged <21 years	<p>What is the evidence from RCTs of smoking prevention interventions for youth delivered via medical or dental providers' offices?</p>	<p>In 2 studies the intervention was entirely practice based i.e. conducted solely in the office. 3 studies found no significant differences between treatment and control groups with respect to initiation of smoking during the follow-up period. Thirty-day tobacco use did not differ in orthodontic patients (12% treatment vs. 12.6% control). The study set in dental clinics in Finland (Kentala et al 1999) reported prevalence of 18.1% among treatment patients and 20.8% among control patients at 2 year follow-up (95% confidence interval 0.65-1.09). There was also no difference in the number of cigarettes smoked per week. Stevens et al (2002) also reported negative results from their intensive, paediatric based intervention at 12 months (95% confidence interval 0.80-1.39), 24</p>	<p>1 UK based study</p> <p>Relevance score: A</p>

				months (95% confidence interval 0.82-1.31), and 36 months (95% confidence interval 0.79-1.20) after the intervention. In the Fidler et al (2001) study 5.1% of the intervention group and 7.8% of the control group reported smoking at 12 month follow-up (95% confidence interval 0.44-0.91), a small but significant reduction in reported smoking among intervention youth.	
Ciliska D et al 2000	Systematic review Level: 2 Review quality: ++ No. of studies: 15	Children aged 4 years of age and older	What is the effectiveness of community based interventions to increase fruit and vegetable consumption in people 4 years of age and older?	After validity rating, the reports rated strong or moderate were selected - 1 was rated strong, and 17 moderate. 4 studies were targeted to parents of young children, 6 to school aged children, and 5 to adults. <u>Interventions with parents of young children:</u> Del Traduce et al (1988) found an increase in fruit and vegetable consumption from 2.6-3.7 servings/day. Cox et al (1996) – statistically significant increased consumption of fruits and vegetables vs. usual control group. Intervention group increased intake of fruit (1.5-2.6) vs. no change in control, vegetables (0.9-1.6) vs. (0.6-0.8) in the control group. Kolinsky et al (1992) – 5 intervention centres – 2 in Maryland had significant increase in fruit consumption compared to control, from 1.9 to 2.72 servings/day also increased intake of vitamin C rich foods. But, the 3 centres in New York had no change in overall vegetable intake or in any fruit and vegetable intake. Hayes et al (1998) – increase in fruit and vegetable consumption of 0.56 servings/day in intervention group and 0.13 in control group. <u>Interventions with school children:</u> Graves et al (1982) – significant effect of intervention on attitude scales of eating nutritious foods and eating vegetables but not for eating new foods. Shannon et al (1982) – significant increase in consumption of carrots/broccoli and spinach salad and green beans. Shannon & Chen (1988) – improvement in attitudes in both groups (control and intervention) over time, however if entry knowledge and attitude scores were low, then intervention children improved more than control. No overall significant differences between groups. Perry et al (1998a) – lunch intake 1.53 servings of fruit and vegetables/day for intervention group vs. 1.06 for control group and increased consumption of fruits. Perry et al (1998b) – analysis of variance showed no difference by sites, gender or ethnicity. Only Texas site showed difference in fruit intake (increased intake in intervention group). Cullen et al (1997) – 1 week post test, increased 24 hour recall fruit and vegetable consumption in intervention group, but not maintained at 3 months post test. Nicolas et al (1998) – significant increase in knowledge in intervention group, and significant increase in fruit and vegetable intake in intervention group.	All studies were conducted in the US with 6 targeting school children. Relevance score: B

				<p><u>Interventions with adults (non-worksite):</u> Campbell et al (1994) – daily intake of fruit and vegetables decreased in each group (control and intervention) by 0.25 servings/day. Gorbach et al (1990) and Henderson et al (1990) – 12 month and 24 month follow-up, fruit and vegetable intake significantly increased in intervention group more than in control from baseline of 15.9% of total kcal/day to 22% at 12 months and 23.1% at 24 months. Brownson et al (1996) – no change in proportion of people who consumed 5+ fruits and vegetables/day.</p> <p><u>Interventions with adults (worksite):</u> Sorensen et al (1996) and Glanz (1998) – intake of fruit and vegetables increased by 0.2 servings per day in intervention group vs. 0.02 in control groups. Collected 3 years after pre-test. Hunt et al (1993) – mean increase in total fruit servings/month was 2.9 in control and 6.8 in intervention and in vegetables a decrease in the control and increase in intervention group (6.8 servings/month).</p>	
Contento I et al 1995	<p>Review including RCTs but not systematic</p> <p>Level: 3</p> <p>Review quality: -</p> <p>No. of studies: preschool children – 23, school age children – 43, adults – 59, pregnant women – 34, older adults (over 65 years of age) - 14</p>	Preschool children, school age children, adults, pregnant women and older adults	Does nutrition education work? If so, what are the successful elements across interventions? What are the implications for nutrition education program design implementation, policy and research?	<p><u>Preschool children:</u> 1. Involvement of parents/family, either as major recipients of program or in conjunction with program offered to pre-school child is extremely important. 2. Behaviourally focussed approach, specifically targeting children's behaviours, shown to increase preference and consumption without didactic teaching. 3. Use of developmentally appropriate learning experiences and materials is critical to success. 4. Food-based activities have been successful in increasing children's food preferences. 5. Activity-based teaching strategies that encourage interaction with real-world objects are essential.</p> <p><u>School age children:</u> 1. Nutrition education more likely to be effective when behaviourally focussed. 2. More likely to be effective when educational strategies are employed that are directly relevant to a behaviourally focus and derived from appropriate theory and research. 3. Interventions need to devote adequate time and intensity to nutrition education to be effective. 4. Family involvement enhances the effectiveness of programs for younger children. 5. Incorporation of a self-evaluation or self-assessment and feed-back component is effective in interventions for older children. 6. Effective nutrition education includes intervening in the school environment. 7. Interventions in the larger community can enhance school nutrition education.</p> <p><u>Adults: Communications:</u> 1. Communications using the media are effective if personally relevant to issues people confront and choices. 2. Use of systematic, audience-based planning framework, can greatly facilitate the process of designing and delivering community-based nutrition education relevant to intended customers. 3. Mass media health campaigns, based on social marketing processes, can increase awareness</p>	<p>Authors do not differentiate between countries of studies included. However, review has much reference to US interventions and focuses on the US predominantly</p> <p>Relevance score: B</p>

				<p>of anticipated consequences of diet and knowledge about behaviours to reduce risk. <u>Interpersonal motivational and behavioural change strategies</u>: 1. Individualised interpersonal counselling and education is likely to be effective in facilitating behavioural change. 2. Educational strategies for individuals and groups are more likely to be motivational if information emphasises personal consequences of behaviours and other motivators and reinforcements relevant to needs and interests of target group. 3. Behavioural change strategies based on social learning theory and behavioural self-management are likely to be effective. <u>Sites</u>: 1. Point of choice interventions in grocery stores and eating establishments can be highly effective in changing purchase intentions and behaviour (but probably only while intervention lasts). 2. Worksite intervention strategies have increasingly moved from using the clinical approach, where high-risk individuals identified and treated, to using public health approach directed at all individuals. 3. Comprehensive community nutrition education/health promotion activities involving mass media, small groups, point-of-purchase information, and others in concert may be moderately effective in reducing diet-related disease risk. <u>Community activation and organisation</u>: Extensive involvement of existing leadership from the beginning of a community intervention and ongoing involvement of organisations and volunteers at each step of the process, so that programs become infused into life of community, are likely to have long-term effectiveness.</p> <p><u>Pregnant women: Methods and timing of interventions</u>: 1. Nutrition counselling and classes that focus on a pregnant woman's specific behaviours, as determined via individualised assessment, have the highest chances of success. 2. Prenatal classes can also be effective, if they are coupled with individual follow-up sessions to reinforce and maintain behaviour, if affective-based educational strategies are used, or if they address the specific needs of the target group. 3. Other media channels do not appear to be as effective as individualised personal nutrition education in improving maternal diets during pregnancy. 4. The decision to breast feed is made early. 5. Prenatal exposure to information about the benefits of breast feeding with respect to the health of the infant, convenience for the mother, and problems and myths concerning breastfeeding positively influences the intention and initiation of breast feeding. 6. An educational programme that includes women's partners and provides incentives for participation can have a dramatic effect in motivating women to breastfeed. 7. Intensive in-hospital bedside counselling and follow-up support strategies increase</p>	
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				<p>breast feeding duration. 8. The use of peer breastfeeding counsellors and provision of home support can improve breast feeding duration.</p> <p><u>Older adults:</u> 1. The use of personalised approaches, such as self-assessment of nutritional status or behaviours and comparison with recommendations, is effective as a starting point for nutrition education. Such an approach is useful in group settings. 2. The use of a behavioural approach is key. Such an approach includes individual self-assessment techniques, such as goal setting, problem solving, enhancement of self-efficacy and social support. 3. Active participation is essential, particularly when combined with a behavioural approach. 4. Attention to motivators and reinforcements is of primary importance, but is often neglected. Older adults, like other adults, already possess a great deal of nutrition information that they do not put into practice. 5. An empowerment philosophy that includes enhancing personal choice, control and social support should be used. 6. Subgroups of older adults need to be identified and targeted. The age, gender and cultural background of older adults need to be considered when developing nutrition education programmes. Those with special needs, such as the very frail, where inadequate nutrition is a problem, diabetics, and others also need to be recognised. 7. Sensitivity to age-related physical changes is necessary.</p>	
Contributors to the Cochrane Collaboration and the Campbell Collaboration 2000	<p>Review of reviews</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: N/A</p>	Not stated	What is the evidence on heart disease, stroke and cancer that can be used in the public health arena?	<p><u>Heart disease and stroke:</u> 1) Higher cigarette prices reduce cigarette consumption. However, the effects of increasing cigarette prices differ across demographic groups, more marked reduction is shown with increasing price amongst women and young people. In the poorest groups an increase in price produces significant hardship for those who do not curtail their consumption. 2) Adverse dietary patterns are reinforced by poverty as pricing policy encourages purchase and consumption of cholesterol raising diets. By extending VAT to the main sources of dietary saturated fat, cardiovascular disease could be avoided and tax revenue generated. However, it is unclear whether this will improve poor people's diets or worsen health by increasing poverty. 3) School interventions: interactive programmes are more effective at changing behaviour than non interactive ones</p> <p><u>Cancer:</u> 1) No systematic reviews have been identified that examine targeting health information on at risk groups on cancer rates. 2) Community intervention programmes in school children, adolescents and adults found the most successful interventions for increasing fruit and vegetable consumption were those that were part of a multi component programme. Successful interventions also included education directed at</p>	<p>Includes UK studies</p> <p>Relevance score: A</p>

				<p>behavioural change, were over a longer period of time period with multiple contacts made with participants and used a message specifically targeted to fruit and vegetables rather than nutrition in general. 3) Public health campaigns on diet, exercise and smoking are likely to be more effective if they take into account variations across cultural groups. 4) Evidence suggests that school health promotion initiatives can have a positive impact on children's health and behaviour but do not do so consistently. Most are able to increase knowledge but changing children's attitudes and behaviour is harder to achieve. 5) Free telephone quit lines, as part of an antismoking campaign, can improve quit rates.</p>	
<p>Cyarto E V, Moorhead G E & Brown W J 2004</p>	<p>Systematic review (RCTs and non-RCTs)</p> <p>Level: 2</p> <p>Review quality: -</p> <p>No. of studies: Physical activity (PA) review – 8, progressive resistance training (PRT) review - 21 RCTs</p>	<p>Individuals aged 60 years or more</p>	<p>What is the evidence relating to physical activity intervention studies in older people?</p>	<p><u>PA Review:</u> Most studies demonstrated success in increasing PA in older people with only 2 studies reporting negative findings. All general practice interventions reported positive effect on PA levels with the most effective study maintaining contact with participants for the longest duration and tailoring the intervention.</p> <p><u>PRT Review:</u> With exceptions, significant increases in strength was reported for healthy participants, those with chronic disease, and the frail or physically limited. Positive effects on disease outcomes were also demonstrated including diabetic glycaemic control, osteoarthritis and chronic heart failure (mixed results for bone mineral density). Most studies demonstrated positive impact of PRT on functional measures although results were sometimes statistically limited.</p>	<p>PA review included 2 studies from the UK whereas PRT review did not include any UK studies.</p> <p>Relevance score: A</p>
<p>DeHaven M et al 2004</p>	<p>Narrative synthesis</p> <p>Level: 2</p> <p>Review quality: -</p> <p>No. of studies: 53</p>	<p>32.1% did not target a specific population, but if it did it tended to be African Americans and adults.</p>	<p>Are health programmes in faith-based organisations effective?</p>	<p>Most programmes focussed on primary prevention (50.9%), usually patient education, in the area of general health maintenance, CV health or cancer. Only just over half of the articles reported outcomes (52.8%). Programmes focussing on heart disease, weight/nutrition, breast cancer, prostate cancer, and smoking cessation achieved statistically significant effects in terms of (respectively) reducing cholesterol and blood pressure levels, increasing fruit/vegetable consumption and reducing weight, increased use of mammography and breast self-examination, increasing knowledge about prostate cancer, and increasing readiness to change regarding smoking cessation. 91% of these programmes were targeted at African Americans.</p> <p>2 of 4 'faith-based' programmes ("developed as part of a congregation's health ministry") showed significant effects (decreased mental illness symptoms).</p> <p>5 out of 6 'collaborative' programmes showed intervention effects with</p>	<p>Non UK studies. Most results were based on African Americans.</p> <p>Relevance score: B</p>

				improvements in overall health status, increases in fruit/vegetable consumption and decreases in weight and blood pressure.	
Dishman R K & Buckworth J 1996	Quantitative synthesis (meta-analysis) Level: 2 Review quality: - No. of studies: 127	Healthy adults and CHD patients, and those at risk of CHD and other chronic diseases	What is the efficacy of physical activity interventions and what are the factors that moderate their success?	Interventions for physical activity have a moderately large effect, equivalent to improving success from 50% without intervention to 70-88%. Effect sizes of the interventions did not differ by gender, age or race. Effects were larger among healthy subjects than patients, although small effects were observed in studies of CHD patients, those at high risk for CHD or other chronic diseases. Interventions incorporating behaviour modification approaches had larger effect sizes than other approaches. Effects were larger among studies using mediated approaches than those using face-to-face delivery. Interventions in community settings and those delivered to groups had larger effects than those in schools and other settings, or delivered to individuals, family and to individual + group combination. Effects were larger when physical activity was not supervised, compared with supervised programme. Effects were unrelated to the duration of the intervention and the follow up. Effects were larger for interventions encouraging active leisure time than those prescribing strength or aerobic exercise. Effect sizes did not differ according to frequency or duration, however, low intensity activity interventions had larger effects than higher intensity interventions.	Non-UK studies. Relevance score: B
Dobbins M et al 2001	Systematic review (including at least one RCT) Level: 2 Review quality: + No. of studies: 19	Children and adolescents; school based	What is the effectiveness of school-based interventions in promoting physical activity and school attending children and adolescents aged 6 to 18 years?	There is conflicting evidence regarding whether or not school based interventions to promote physical activity in primary children have a positive effect on lifestyle behaviours including physical activity rates (2 positive, 1 no effect), duration of physical activity (3 positive, 3 no effect) and television viewing (2 positive, 1 approaching significance). It is unclear which interventions are likely to be most effective, although there is some indication that programmes of longer duration may be more likely to affect physical activity duration. There is very limited evidence (tested by only one study) to suggest that children exposed to school based interventions lead more active lives as adults. There is conflicting evidence regarding whether or not school based interventions increase physical activity rates in adolescents (1 positive, 1 no effect). There is very limited evidence that school based interventions increase physical duration in adolescent girls (one positive) and no evidence for boys. There is no evidence of the impact on school based interventions on television viewing in adolescents. Generally school based interventions are not effective in altering most physical health status	1 UK study Relevance score: A

<p>Edwards N, Aubin P& Morrison M 2000</p>	<p>Systematic review (RCTs and non-RCTs)</p> <p>Level: 2</p> <p>Review quality: ++</p> <p>No. of studies: 19</p>	<p>Women and their families</p>	<p>What is the effectiveness of strategies to reduce smoking relapse during the postpartum period? Do smoking relapse interventions that target the partner or family members yield any improved benefits over smoking relapse interventions targeting the woman alone? What is the effectiveness of smoking relapse interventions during pregnancy vs. interventions during pregnancy and postpartum or during the postpartum period only?</p>	<p>indicators. However, few projects measured these secondary outcomes.</p> <p><u>Postpartum interventions:</u> 1/1 study showed a significantly lower relapse rate at 6 months postpartum but this was not maintained at 12 months. The intervention was multicomponent, involved multiple levels of the healthcare system and was delivered over 3 months.</p> <p><u>Prenatal interventions:</u> 2/3 studies showed no intervention effect on quit rates.</p> <p><u>Borderline studies:</u> Mixed effect were seen. One study compared extended and care group compared to minimal care at 6 months postpartum. Extended care resulted in significantly lower relapse rates. Studies specifically examined spontaneous quitters as a sub group. All the women in the effective postpartum study were spontaneous quitters. One borderline study showed that strategies had greater effects on spontaneous quitters than those who quit with the help of an intervention. The role of partners: limited or absent partner involvement in interventions was seen.</p>	<p>Unable to tell where all studies performed</p> <p>Relevance score: B</p>
<p>Engbers LH et al 2005</p>	<p>Systematic review (RCTs)</p> <p>Level: 2</p> <p>Review quality: ++</p> <p>No. of studies: 13</p>	<p>Adults (undergoing worksite health promotion programs)</p>	<p>What is the effectiveness of worksite health promotion programs (WHPPs) with environmental modifications on physical activity, dietary intake, and related outcomes?</p>	<p><u>Physical activity (PA):</u> Three studies of relatively low quality – inconclusive evidence on effectiveness on PA of WHPPs including environmental modifications.</p> <p><u>Diet:</u> 6 of the 13 studies measured effect of WHPP on fruit and vegetable intake and all demonstrated significant positive changes compared to controls. For 6 studies that measured the effect of WHPP on fat intake all but one found significant decrease in fat intake. No differences were observed for the study that measured the impact of WHPP on fibre intake.</p> <p><u>Health risk indicators:</u> None of the 4 studies evaluating the effect of WHPPs on cholesterol levels demonstrated significant effects. Of the 3 studies evaluating the effect of WHPPs on Body Mass Index (BMI), only 1 study demonstrated a small significant increase. No significant changes were found in the only study that evaluated the effects of WHPP on blood pressure.</p>	<p>Not specified where studies were conducted.</p> <p>Relevance score: B</p>
<p>Eysenbach G et al 2004</p>	<p>Systematic review (including at least one</p>	<p>Adults (using virtual community</p>	<p>What is the evidence on the effects on health and</p>	<p>The review includes 12 studies on depression, 12 on social support and 3 on health care use, these are not reported here.</p>	<p>Review does not state which countries studies</p>

	<p>RCT)</p> <p>Level: 2</p> <p>Review quality: -</p> <p>No. of studies: 38</p>	<p>interventions focusing on emotional and social support, health education, or health-related behaviour change)</p>	<p>social outcomes of computer based peer to peer communities and electronic self-support groups, used by people to discuss health related issues remotely?</p>	<p><u>Weight loss or healthy body-weight interventions</u> (9 studies): the findings were mixed but were mainly non significant. <u>Diabetes intervention</u> (5 studies): there was a significant improvement in glycosylated haemoglobin in one before-and-after study. <u>Smoking cessation</u> (6 studies): the levels of abstinence following the intervention were variable. 1 RCT found no significant improvement in the intervention group over the comparison group. 1 RCT found some small differences, although significance levels were not reported.</p>	<p>from.</p> <p>Relevance score: B</p>
<p>Fletcher A & Rake C 1998</p>	<p>Systematic review (including at least one RCT)</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 23</p>	<p>Free living (i.e. not institutionalised) individuals over 65</p>	<p>What is the evidence from studies of interventions to promote health eating in elderly people living in the community?</p>	<p><u>Nutrition interventions in elderly people in the community meal setting:</u> A small RCT and a small uncontrolled study showed post-intervention benefits. The RCT found changes in self reported behaviour and the controlled study found changes in serum lipids. The control study showed no effects but was very weak and the control group was possibly contaminated. The reviewers' state that large benefits seen in the RCT (62% eating adequately intervention vs 9% control) were likely to be due to the focus of high-risk individuals with nutritionally inadequate diets, the use of a motivational group-led model and emphasis on improving vitamin, protein and mineral intake.</p> <p><u>Nutrition interventions in elderly people in communal settings:</u> 9 studies provide very weak evidence of effect but all pointing in the direction of improved behaviour following intervention. Participants were mostly women. A range of income groups were represented. <u>Nutrition interventions in the elderly population living in the community:</u> No RCTs. 2 controlled and 4 uncontrolled studies (3 of the latter post-intervention data only). 1 controlled study showed no evidence of effectiveness but small differences were observed which the study was underpowered to detect. The other controlled study showed very large (>50%) increase in wholegrain bread sales in participants randomised to community organisation strategy (including the media, community events, bread pricing and social marketing) compared to a patient education system (leaflets handed out by local physicians) or control.</p> <p><u>Nutrition interventions as part of health promotion interventions:</u> 4 RCTs, only 1 showed effectiveness. The intervention was based on personal computerised feedback to lifestyle questionnaires.</p>	<p>No studies in UK, 21 US. The best conducted studies were in the context of adding health promotion to insurance policies in the US.</p> <p>Relevance score: B</p>
<p>Foster C & Hillsdon M 2004</p>	<p>Systematic review (including 1 RCT)</p> <p>Level: 2</p>	<p>Adults</p>	<p>What is the effect of environmental interventions to increase health-enhancing physical activity</p>	<p><u>Changing the environment:</u> Three studies addressed the impact of physical changes to the working environment on HEPA or physical fitness and showed small increases in fitness. 1/3 studies was an RCT. The intervention approached but did not reach statistical significance (p=0.08). 2/3 studies were carried out in military settings and the 3rd was</p>	<p>Almost half the studies conducted in the UK</p> <p>Relevance score: A</p>

	<p>Review quality: -</p> <p>No. of studies: 19</p>		(HEPA)?	<p>carried out in a factory.</p> <p><u>Stair interventions:</u> 16 before and after studies studies have reported the results of written media (e.g. posters, riser banners) to prompt stair use rather than escalators or lifts. Most only demonstrated a short term effect of up to 3 months, with only 1 seeing an effect 6 months after baseline. 2 studies found that younger people were more likely to respond to prompts and that in one intervention the effect was greater in a shopping center than a railway station. 2 studies demonstrated differences between the sexes, with one finding that fewer women chose to use the stairs and the other finding that women were more likely to use the stairs. 1 study found that poster size was related to effectiveness and also that stair risers had a greater effect than posters alone.</p>	
Gepkens A & Gunning-Schepers L J 1996	<p>Systematic review (narrative synthesis)</p> <p>Level: 2</p> <p>Review quality: -</p> <p>No. of studies: 129</p>	Not stated	How effective are interventions to reduce socioeconomic health differences? What are the possible conditions for success?	<p><u>Structural measures</u> (mostly financial accessability, USA): 11 effective, 4 dubious, 1 ineffective. <u>Interventions within existing healthcare services:</u> 5 effective, 4 dubious, 3 ineffective. <u>Health education:</u> Providing information: 6 effective, 6 dubious, 4 ineffective. Providing information and personal support: 32 effective, 12 dubious, 5 ineffective. Health promotion and structural measures: 2 effective, 1 dubious. Remainder 2 effective, 1 dubious. Evaluating the health education interventions shows that programmes providing only information seem to be especially effective in the higher SES groups whereas programmes providing information in combination with personal support (for example by a health visitor) seem to be the most effective type of intervention for all SES groups. Most interventions have been aimed at increasing knowledge or behaviour rather than health outcomes.</p>	<p>A relatively large proportion of studies (20% published, 26% unpublished) were carried out in the UK. However, most structural interventions were aimed at the financial accessability of health services in the USA.</p> <p>Relevance score: A</p>
Gorin SS & Heck JE, 2004	<p>Meta-analysis (of RCTs and quasi-experimental studies)</p> <p>Level: 2</p> <p>Review quality: -</p> <p>No. of studies: 37</p>	Health professionals	<p>Are some health professions more effective in providing smoking cessation? Which intervention and study characteristics explain most variation in intervention effects?</p>	<p>Physician and health professional team interventions are effective in smoking cessation rates. Effectiveness of nurse and dentist interventions are not statistically significant. Physician and dentist interventions are more effective than nurse interventions (however, small dentist study number may caution comparability with this group). Funnel plot analysis suggested that publication bias may have occurred.</p>	<p>Only included studies from US. Does not include pharmacist interventions which may be more significant in the UK compared to US (where review was conducted)</p> <p>Relevance score: B</p>
Hajek P et al, 2005	<p>Systematic review (of RCTs or quasi-randomised CTs)</p>	Smokers	Do specific interventions for relapse prevention reduce the proportion of	<p>They detected no benefit of brief and skills-based relapse prevention interventions for women who had quit smoking due to pregnancy, or for smokers undergoing a period of brief abstinence. They also failed to</p>	<p>Includes 2 UK studies</p> <p>Relevance score: A</p>

	<p>Level: 1</p> <p>Review quality: -</p> <p>No. of studies: 40</p>		<p>recent quitters who return to smoking?</p>	<p>detect significant effects in trials in other smokers who had quit on their own or with a formal programme. Amongst trials recruiting smokers and evaluating the effect of additional relapse prevention components they also found no evidence of benefit in any subgroup. They did not find that providing training in skills thought to be needed for relapse avoidance reduced relapse, but most studies did not use experimental design best suited to the task, and had limited power to detect expected small differences between interventions.</p>	
<p>Harden A, Weston R & Oakley A, 1999</p>	<p>Systematic review (narrative synthesis) (including at least one RCT)</p> <p>Level: 3</p> <p>Review quality: +</p> <p>No. of studies: 27</p>	<p>Young people aged 11-24 years old</p>	<p>What is the effectiveness of peer-delivered health promotion in promoting young people's health? What characteristics differentiate peer-delivered interventions from teacher-delivered interventions?</p>	<p>Of the outcome studies, seven were effective for behavioural outcomes, three were effective for 'proxy outcomes', 1 was ineffective and 1 was unclear. Specifically for smoking, 3 were effective for behavioural outcomes, 1 was ineffective and 1 was unclear. There was no clear relationship between the characteristics of the interventions and effectiveness. Of the process evaluations the main results were as follows: in terms of acceptability, most young people expressed positive views on peer-delivered health promotion and negative views were rarely documented. In terms of implementation issues, conflict between the philosophy of peer education and the school environment was identified as a barrier and such organisational contexts made working with young people challenging. There was some evidence that peer-delivered interventions were more likely to be effective in young women.</p>	<p>No outcome studies were UK-based.</p> <p>Relevance score: A</p>
<p>Hey K & Perera R, 2005</p>	<p>Systematic review (including at least one RCT)</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 15</p>	<p>Smokers</p>	<p>Do competitions, contests and incentives reduce the prevalence of smoking and relapse? Does the amount and type of incentive affect cessation and relapse prevention? Do incentives improve recruitment to smoking cessation programmes, both within the community and within the workplace? Does the amount and type of incentive affect recruitment?</p>	<p>Competitions and incentives offer smokers who quit for a minimum period the change to win money or prizes. They do not appear to help smokers to quit in the medium to long-term. Smokers may quit while they take part in the competition or receive rewards for quitting, but do no better than unassisted quitters once the rewards stop. The type of reward and whether or not the smokers put up their own money to take part make little difference to the success of the quit attempt. Competitions and rewards may attract more people to make a quit attempt than might otherwise do so, but cessation rates remain the same as for non-contestants.</p>	<p>Mostly US studies. Two-thirds based in worksites. The structure of the US healthcare system obliges employers to cover health insurance for workers, so have more incentive for workers to quit smoking.</p> <p>Relevance score: A</p>

			<p>What are the cost implications to employers and to the community of incentives and competitions?</p> <p>Are incentives and competitions more or less effective in combination with other aids to recruitment, cessation and relapse prevention?</p> <p>How great is the risk of disbenefits arising from the use of competitions and incentives, e.g. false claims, ineligible applicants?</p>		
Hey K & Perera R 2005	<p>Systematic review (including at least one RCT)</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 4</p>	Smokers	<p>What are the effects of community-based contests such as Quit and Win on rates of smoking cessation?</p>	<p>All 4 included studies found significant differences in the 1-year quit rates between the experimental and control participants. Quit and Win contests may have a small effect on the community smoking rate, but evidence from randomised controlled trials is lacking. Controlled trials suggest that quit and win contests may help some smokers to quit, but they have little effect on community smoking rates. Less than one smoker in 500 quits because of the contests. Deception levels, where they can be measured, are often high. International quit and win contests are often well supported, especially in developing countries, but there is no clear evidence from trials that they are effective.</p>	<p>2 studies from USA, and 1 each from Canada and Russia, but no reason to believe Quit and Win contests would not have same results in UK.</p> <p>Relevance score: B</p>
Hider P 2001	<p>Systematic review</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 75</p>	Various – employees, school children, general public, etc.	<p>What is the effectiveness of environmental interventions at reducing calorie intake or calories density?</p>	<p>Environmental interventions based in educational settings were associated with variable effects on dietary behaviour. Although some improvements in eating habits have been reported most studies (especially those that included an educational intervention) have not found any significant improvement in dietary behaviour. Restaurant-based environmental interventions are relatively inexpensive and easy to deploy and appear successful at improving sales figures of targeted items over the duration of their use. In particular, point of choice information in restaurants and cafeterias increase the sales of targeted items during the duration of their use, especially if they include promotional rather</p>	<p>Most research conducted in the US (53/75 studies).</p> <p>Relevance score: B</p>

				<p>than just educational messages. Mixed educational and environmental interventions located at workplaces can effectively improve dietary habits although not all programmes have been successful. Providing shoppers with electronic feedback about their purchases appears a promising supermarket-based intervention to reduce calorie intake. Other environmental interventions in supermarkets have generally provided positive results and most have at least been associated with significant increases in the sales of selected items. In recent trials community based environmental interventions, despite their potential to improve the health status of the whole population, have been associated with only modest results.</p>	
Hillsdon M et al 1995	<p>Systematic review of RCTs</p> <p>Level: 1</p> <p>Review quality: +</p> <p>No. of studies: 10</p>	Health, free living adults	What is the evidence of effective promotion of physical activity?	<p><u>Location of exercise:</u> One study compared home and facility based exercise and found that adherence was significantly higher in the home based groups. Another home based study showed a positive relationship between the convenience of exercise and its adoption and maintenance which may explain why home based exercise seems preferable.</p> <p><u>Frequency of exercise:</u> At the end of the trials those subjects still exercising were usually exercising around twice per week. 1 study tested prescribed regimes of 5/week vs 3/week and found that after 2 years adherence was higher in the 3/week group.</p> <p><u>Self monitoring:</u> 2 studies found greater levels of exercise in subjects randomised to self monitoring, whereas one did not. However, in the latter study only 55% of participants completed their records.</p> <p><u>Relapse Prevention Training:</u> 1 study showed no difference between relapse prevention training compared to reinforcement strategies. Another study showed that relapse prevention training increased exercise levels in subjects exercising alone but not in those exercising in a group.</p> <p><u>Professional contact:</u> 1 study found that subjects randomised to follow up telephone prompting carried out more physical activity than those who did not. Significantly higher levels of exercise were achieved in groups with higher prompt frequency.</p>	<p>All studies carried out in the USA.</p> <p>Relevance score: B</p>
Jepson R 2000	<p>Review of reviews</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: N/A</p>		<p>How effective are interventions to change health related behaviours?</p> <p>[NB. Six behaviours were included in the review but data has been</p>	<p><u>Smoking</u> Reasonable effect: physician advice, smoking cessation programmes implemented in pregnancy, advice given by nurses, group programmes and individual smoking cessation. Modest effect (evidence not strong): mass media campaigns, school-based programmes, simple physician advice, self help materials. Likely to be ineffective: local ordinances alone as tobacco obtained from other sources. Not enough evidence of effect: Prevention of smoking in public places. <u>Exercise</u> Reasonable effect: GP advice, behaviour modification produces larger</p>	<p>The majority of research on smoking and exercise was USA based; countries where diet-based research was conducted unknown.</p>

			extracted for smoking, exercise and diet only in line with research objectives]	<p>effects than other techniques. Effect sizes are larger in studies using medicated approaches compared to face to face delivery. Moderate effect: Physical activity promotion schemes in primary care, workplace interventions to increase the number of smokers who smoke regularly, interventions that encourage walking and do not require attendance at a facility are most likely to lead to substantial increases in overall activity. Not enough evidence: Regular aerobic exercise during pregnancy appears to improve or maintain physical fitness but insufficient data to exclude important risks or benefits to the mother or infant.</p> <p><u>Diet</u> Reasonable effect: interventions based theories of behavioural change. Modest effect: dietary advice as primary prevention in adults, school based programmes that include eating behaviours as a component of the intervention, health promotion intervention to improve diet in elderly people, nutritional advice appears effective in increasing women's energy and protein intakes but has rather modest health benefits. Community based programmes aimed at women of childbearing age provide evidence of effectiveness in the short term. Likely to be ineffective: studies based on a dissemination of information and teaching of skills model. Not enough evidence: Interventions to prevent weight gain exhibited various degrees of effectiveness. Definite statements about the elements of the intervention that were associated with significant effect size cannot be made as only one of the 5 RCTs reported a significant effect on weight.</p>	Relevance score: B
Kaper J et al 2005	<p>Systematic review (including at least one RCT)</p> <p>Level: 1</p> <p>Review quality: ++</p> <p>No. of studies: 7</p>	Smokers	What is the effect of using healthcare funding interventions to reduce the costs of providing or using smoking cessation treatment on abstinence from smoking?	<p>When comparing full financial benefit with no benefit, smokers in the full benefit group had a 1.5 times higher chance of achieving self-reported abstinence. The chance of making a quit attempt was 1.3 times higher in the full benefit group. The use of NRT and bupropion was respectively 2.9 and 2.5 time higher for full benefit smokers than for no benefit smokers. The number of smokers who participated in a behavioural programme was not significantly higher with a full benefit compared with no benefit.</p> <p>1 study assessed effects of financial incentives to HCPs who reached targets for identifying smokers and advising them. No significant effect was found on self-reported abstinence and no evidence of change in clinical practice in intervention group.</p>	<p>Although 1 study was UK based the review is concerned with financial help for healthcare which does not translate well to the UK where healthcare is free.</p> <p>Relevance score: C</p>
Ketola E, Sipila R & Makela M 2000	<p>Systematic review of experimental studies</p> <p>Level: 1</p>	Adults of working age	What is the relative effectiveness of individually targeted lifestyle interventions in	<p><u>Smoking</u>: Pooled results are not reported. 4/18 interventions were effective. One person stopped smoking for every 414 smokers targeted.</p> <p><u>Sodium decrease</u>: No pooled results are reported. Two primary prevention studies were effective (no data on number of studies</p>	Information regarding countries which the studies were conducted in is not given.

	<p>Review quality: -</p> <p>No. of studies: 42</p>		<p>primary and secondary prevention of CVD?</p>	<p>measuring this outcome). 1/2 single factorial secondary prevention studies were effective, the other having insufficient data for evaluation). 2/4 multifactorial secondary prevention studies were effective.</p> <p><u>Exercise:</u> Results were not combined due to heterogeneous outcome measures. 10/16 interventions were effective.</p>	<p>Relevance score: B</p>
<p>Kramer M S & Kakuma R 2003</p>	<p>Systematic review</p> <p>Level: 1</p> <p>Review quality: -</p> <p>No. of studies: 23</p>	<p>Pregnant women</p>	<p>What are the effects of advice to increase or reduce energy or protein intake, or of actual energy or protein supplementation or restriction, during pregnancy on energy and protein intakes, gestational weight gain and the outcome of pregnancy?</p>	<p>In 5 trials involving 1134 women, nutritional advice to increase energy and protein intakes was successful in achieving those goals, but no consistent benefit was observed on pregnancy outcomes. In 13 trials involving 4665 women, balanced energy/protein supplementation was associated with modest increases in maternal weight gain and in mean birth weight, and a substantial reduction in risk of small for gestational age (SGA) birth. These effects did not appear greater in undernourished women. No significant effects were detected on preterm birth, but significantly reduced risks were observed for stillbirth and neonatal death. In 2 trials involving 1076 women, high protein supplementation was associated with a small, nonsignificant increase in maternal weight gain but a nonsignificant reduction in mean birthweight, a significantly increased risk of SGA birth, and a nonsignificantly increased risk of neonatal death. In 33 trials involving 966 women, isocaloric protein supplementation was also associated with an increased risk of SGA birth. In 3 trials involving 384 women, energy/protein restriction of pregnant women who were overweight or exhibited high weight gain significantly reduced weekly maternal weight gain and mean birth weight but had no effect on pregnancy induced hypertension or pre-eclampsia.</p>	<p>6 studies performed in the UK</p> <p>Relevance score: A</p>
<p>Krummel DA et al 2001</p>	<p>Systematic review (including at least one RCT)</p> <p>Level: 2</p> <p>Review quality: -</p> <p>No. of studies: 51 (16 smoking, 19 physical activity, 8 diet, 8 multiple risk factors).</p>	<p>Adult women</p>	<p>What interventions are effective in promoting cardiovascular health in women?</p>	<p>Smoking: Pregnancy and the postpartum period are opportune times to treat tobacco dependence in women. More intense interventions with individualised approaches yield the best outcomes. Most pregnant women who reduce/quit during pregnancy resume postpartum. Women are more likely to participate in community based programmes than men but are less likely to quit as a result. Physical activity: Behavioural strategies, such as daily self monitoring, feedback, contracts and incentives have been effective in study participants. Whether these changes in physical activity behaviour are sustained as a lifestyle change is unknown. Women respond better to lifestyle physical activity recommendations versus structured exercise regimens. Diet: Very few interventions have been tailored towards women. Multifactorial: no interventions were specifically tailored towards women.</p>	<p>Unable to tell where studies performed.</p> <p>Relevance score: B</p>
<p>Lancaster T & Stead L F 2004</p>	<p>Systematic review (including at least one</p>	<p>Smokers</p>	<p>What is the effectiveness of advice from</p>	<p>Main result: Brief advice versus no advice (or usual care) increased the odds of quitting (evidence from 17 trials: OR=1.74, 95%CI: 1.48-2.05).</p>	<p>At least 12 studies were conducted in the</p>

	<p>RCT)</p> <p>Level: 2</p> <p>Review quality: ++</p> <p>No. of studies: 39</p>		<p>physicians in promoting smoking cessation?</p> <p>Are minimal interventions by physicians more or less effective than more intensive interventions?</p> <p>What is the effectiveness of various aids to advice in promoting smoking cessation?</p> <p>What is the effect of anti-smoking advice on disease specific and all-cause mortality?</p>	<p>No conclusive evidence that effectiveness of physician advice varied depending on intensity of intervention, amount of follow-up, aids used in consultation (indirect comparisons). However, 1) Small advantage of intensive advice over minimal advice (direct comparison) but indications of some heterogeneity, 2) Small benefit of follow-up visits (direct comparison). Effectiveness of advice may be greater in populations with established disease versus smokers from unselected population (indirect comparison) but this is derived from a small number of trials. Only one study determined the effect of smoking on mortality (inconclusive evidence).</p>	<p>UK, with the majority conducted in Western countries (US, Canada, Australia).</p> <p>Relevance score: A</p>
Lancaster T & Stead LF 2005	<p>Systematic review of experimental studies</p> <p>Level: 1</p> <p>Review quality: -</p> <p>No. of studies: 21</p>	Smokers	<p>Is individual counselling more effective than no treatment or brief advice in promoting smoking cessation?</p> <p>Is individual counselling more effective than self help materials in promoting smoking cessation?</p> <p>Is a more intensive counselling intervention more effective than a less intensive intervention?</p>	<p>Individual counselling was more effective than control.</p> <p>In a subgroup of 3 trials where all participants received nicotine therapy the point estimate of effect was smaller and failed to reach significance. There was no evidence of a greater effect of intensive counselling compared to brief counselling (3 studies only).</p>	<p>2 UK studies, the rest USA.</p> <p>Relevance score: A</p>
Lancaster T & Stead LF 2005	<p>Systematic review of experimental studies</p> <p>Level: 1</p> <p>Review quality: -</p> <p>No. of studies: 60</p>	Smokers	<p>Are self help interventions better than no treatment in promoting smoking cessation?</p> <p>Do different forms of self help (written materials, audi and video tape) have equivalent</p>	<p>In 11 studies comparing posted self help materials to no intervention there was a pooled effect that just reached significance (OR 1.24, 95% CI 1.07-1.45, NNT 100). This analysis excluded 2 trials with strongly positive outcomes that introduced significant heterogeneity. 4 further trials in which controls received alternative written materials did not show benefit of the smoking cessation self help materials. In 5 trials where the materials were delivered in person rather than by post there was no evidence of a significant effect (OR 1.2, 95% CI, 0.96-1.49). In 11 trials in which self-help materials were tested as an adjunct to face to</p>	<p>Studies carried out in a large variety of countries including UK.</p> <p>Relevance score: A</p>

			effect? Are approaches tailored to the individual more effective than non-tailored materials?	face advice from a healthcare provider there was no evidence that the additional self help materials significantly increased quit rates whether controls did (OR 1.15 95% CI 0.77-1.72) or did not (OR 0.91, 95% CI 0.7-1.17) receive alternative written materials. When all trials of self help materials were pooled and compared to no self help, irrespective of level of contact there was no evidence of an effect (OR 1.11 95% CI 1.00 to 1.22). In 3 trials examining self help materials in addition to NRT there was no evidence of an additional benefit from the materials over the relatively high quit rates achieved by NRT (OR 1, 95% CI 0.77-1.99). In 17 trials using materials tailored for the characteristics of individual smokers, a small benefit of tailored materials was seen (OR 1.42, 95% CI 1.26-1.61). The evidence was strongest for tailored materials compared to no intervention, but also supports tailored interventions as more helpful than standard materials. Part of this effect could be due to additional contact required to obtain individual data. A small number of other studies failed to detect benefits from using additional written materials, videos or targeted materials. In 10 trials comparing different types of self help programme no significant differences were seen in abstinence after 12 months (no meta analysis performed due to heterogeneity).	
Lawlor D A & Hanratty B 2001	Systematic review (including at least one RCT) Level: 2 Review quality: ++ No. of studies: 8	Individuals in routine primary care consultations	What effect does advice given in routine primary care consultations have on levels of physical activity?	Of 6 studies reporting short-term results (8 weeks), 4 found advice effective at increasing PA. Of 4 studies reporting long-term results (3-4 months), one found advice effective at increasing PA. 1 of the 2 RCTs found no evidence of effect at both short- and long-term follow-up, the other RCT found no evidence of effect after 4 and 12 months.	6 studies from US, 2 from Australia. Relevance score: B
Lawrence D et al 2003	Narrative review Level: 2 Review quality: - No. of studies: 36	Smokers from the following ethnic/minority groups: Asian/American/ Pacific Islander, Black/African American, Hispanic American/Latino/ Mexican American	What is the evidence regarding smoking cessation interventions in U.S. racial/ethnic minority populations?	17 studies occurred in a clinic setting, 19 were either in a community site or directed to an entire community. <u>Clinic based findings:</u> 6 clinic based studies reported statistically significant differences in cessation rates for Black/African Americans in the treatment groups compared to the control groups. 1 study, that included both Black and Hispanic smokers, reported outcome rates not significant for Hispanic smokers. 11 of the 17 clinic based studies used biochemical verification of smoking. The outcome rate at final follow up ranged from 0 to 30% in intervention groups and 0 to 15% in control groups. 6 clinic based studies reported statistically significant difference	Focus of study on US minority populations therefore not likely to be relevant in the UK due to differences in the ethnic make up of groups. Relevance score: C

		and Native American/Indians/ North American/ American Indian.		in racial/ethnic minority abstinence rates of intervention groups compared with controls. However, there were large variations among these studies, including if cessation was subjected to biochemical verification. <u>Non clinic based findings:</u> 19 studies took place in specific community sites or were directed at the entire community using individual interventions, media and system interventions. All of the 8 interventions that produced significant results contained multiple components and 6 of the 8 were culturally specific. 12 of the 19 non-clinic based studies used materials that were culturally specific. Abstinence rates ranged from 8 to 27% in the intervention groups and 0 to 19% for the control groups. Although eight studies produced statistically significant results, only 2 of these studies used biochemical verification. There remains a significant gap in knowledge about the effectiveness of either individual or societal level smoking cessation interventions among racial and ethnic minorities.	
Lumley J et al 2004	Systematic review of experimental studies Level: 2 Review quality: + No. of studies: 64	Pregnant women	What are the effects of smoking cessation programs during pregnancy on the health of the fetus, infant, mother and family?	There was a significant reduction in smoking in the intervention groups of the 48 trials included measuring smoking status in late pregnancy (RR 0.95, 95% CI 0.93-0.95). The 36 trials with biochemically validated smoking cessation had a similar reduction (RR 0.94, 95% CI 0.92-0.95). Absolute differences in the proportion continuing to smoke = 6% in both analyses. Smoking cessation interventions reduced low birth weight (RR 0.81, 95% CI 0.7 -0.94) and pre-term birth (RR 0.84, 95% CI 0.72-0.98) and there was a 33g (95% CI 11g-55g) increase in mean birth weight. There was no statistically significant differences in very low birthweight, still births, perinatal or neonatal mortality but these analyses were underpowered due to lack of studies measuring these outcomes. 1 intervention strategy, rewards plus social support (2 trials) resulted in a significantly greater smoking reduction than other strategies (RR 0.77, 95% CI 0.72-0.82). 5 trials of smoking relapse prevention (>800 women) showed no statistically significant reduction in relapse.	Studies carried out in a large variety of countries including UK. Relevance score: A
McArthur D B 1998	Systematic review (meta-analysis) Level: 2 Review quality: + No. of studies: 12	Children aged 9-11 years.	What are the effects of school-based interventions on heart healthy eating behaviours of fourth and fifth grade students?	The overall effect size (d value) across 12 studies was .24 (ranging from 0.15 to 1.69). According to Cohen (1977) d= .20 is considered a small effect size. Although small it suggests the positive effect of the school based intervention. The 95% confidence interval ranged from .174 to .301. It can be concluded according to the author that the school-based cardiovascular health promotion programmes had a significant effect on the heart healthy eating behaviours of student participants.	US studies Relevance score: C

<p>McBride C M, Emmons K M & Lipkus I M 2003</p>	<p>Narrative review</p> <p>Level: 3</p> <p>Review quality: -</p> <p>No. of studies: 160</p>	<p>Smokers</p>	<p>Does a TM increase perceptions of personal risk and outcome expectancies, in relation to smoking cessation?</p> <p>Does a TM prompt strong affective or emotional responses, in relation to smoking cessation?</p> <p>Does a TM redefine self concept or social role, in relation to smoking cessation?</p>	<p>A teachable moment (TM) is the name used to describe a naturally occurring health event thought to motivate individuals to spontaneously adopt risk-reducing health behaviours.</p> <p>The cessation rates for each of the 4 TMs (health visit, test results, pregnancy, hospitalization) were graphed. Rates taken were those observed by more than one study; that of a low, middle and high rate were reported on the graph to categorise the full range of cessation for a TM. The range of cessation rates associated with pregnancy and hospitalisation was large (10-60 and 15-78 % respectfully). In contrast the rate for health visit and test results were consistently and substantially lower (2-10 and 7-21% respectfully). It is difficult however to evaluate if this observed difference indicates true differences in the potency of these events as TMs or reflects differences in target populations, cessation measures used and the timing of follow up. However the relatively high cessation rates near the occurrence of hospitalization or disease diagnosis (in many cases well above the 20% achieved through formal interventions) suggests some events may well be TMs.</p>	<p>Unable to ascertain if included UK studies, but findings likely to be generalisable to a UK population.</p> <p>Relevance score: B</p>
<p>McDonald P et al 2003</p>	<p>Narrative review with evidence review panel</p> <p>Level: 2</p> <p>Review quality: -</p> <p>No. of studies: 20</p>	<p>Smokers aged 12-24 years</p>	<p>What is the scientific basis from which to develop and select smoking cessation treatments for adolescents?</p>	<p>9 studies reported treatments that increased quit rates. Cognitive behavioural principles were central to 8 of the 9 effective programs. The other effective program employed a combination of cognitive-behavioural principles and motivational enhancement. The 1 study that used nicotine replacement therapy did not appear to produce a significant positive treatment effect. Half of treatments were delivered in school settings, outside the classroom. 3 of these produced significant treatment effects. 4 studies were delivered through clinical settings, 2 of which produced significant treatment effect. 1 study delivered through the family did not have a significant effect. All but 3 studies offered voluntary treatment. All mandatory treatments showed no significant effect. 9 of the 16 voluntary programs resulted in significant results. All but 2 studies were targeted to individuals or small groups. 2 population studies showed no significant effect. 2 studies did not provide sufficient information to determine who delivered the treatments. 4 studies out of 6 that used teachers and school staff to deliver interventions; 2 studies of 4 using medical personnel, 2 studies of 4 employing health educators, counsellors or psychologists external to the delivery setting produced effective treatments; and one study of 3 that relied on adolescent peers was effective in increasing quit rates. A single study that used computer-based expert system did not appear successful in improving quit rates.</p>	<p>Unable to ascertain if includes UK studies, but findings likely to be applicable in the UK.</p> <p>Relevance score: B</p>

McLean N et al 2003	Systematic review (including at least one RCT) Level: 2 Review quality: - No. of studies: 21	Children and/or adults	What is the nature of family involvement in weight control, maintenance and weight-loss interventions?	Involving family members in weight control, maintenance and weight-loss may improve effectiveness: Generally more support for spouses being treated together (statistically significant improvement in 3 studies, non-significant improvement in 2 studies {overall difference between intervention groups: 0.3-6.1kg}, significant worsening effect in 1 study, non-significant worsening trend effect in 2 studies {overall difference between intervention groups: 1.3-5.9kg}). Adolescents targeted separately from mothers lost significantly more weight than with (evidence from 1 study only {overall difference between intervention groups: 10.6 kg}). Targeting children and adults together seemed to yield positive results for children (1 study significant effects at 10-year follow-up; 1 study non-significant effects at 1-year follow-up {overall difference between intervention groups: 1.4-11.7kg}). Generally, the greater number of behaviour change techniques taught to both parents and children, the more successful weight loss or weight control.	No studies from the UK, and mostly US studies. Differences in prevalence of obesity in the UK compared with US, and the differences in health-care systems may, in this instance, limit the generalisability of findings. Relevance score: B
Moher M, Hey K & Lancaster T 2005	Systematic review (including at least one RCT) Level: 2 Review quality: + No. of studies: 61	Adult smokers	What is the extent to which different kinds of workplace smoking programmes help smokers to reduce or stop cigarette consumption? Are different types of workplace programmes more effective in helping employees to stop or reduce smoking?	Group therapy, individual counselling and pharmacological treatment are effective in the workplace. However, these treatments have also been shown to be effective outside the workplace. Self help interventions are less effective, a finding common to other settings. There is limited evidence that cessation programmes aimed at the individual are more effective when combined with environmental support. Restrictions and bans decrease cigarette consumption at work but there is conflicting evidence as to whether they decrease prevalence of smoking or overall consumption of tobacco by smokers. Only 6 of the 61 studies addressed economic issues (5 USA, one Australia). It is difficult to compare the costs and cost effectiveness of interventions across the studies as the figures quoted vary across time and country and the methods of calculating costs differ between studies.	Studies were carried out in different countries, including the UK. Relevance score: A
Morgan O 2005	Narrative review Level: 2 Review quality: + No. of studies: 9	General public	What is the current evidence of effectiveness for exercise-referral schemes?	Exercise referral schemes appear to increase PA levels in certain populations, although effect may not last long term. Motivational activities combined with exercise provision appear more effective than low recruitment and adherence has cost-effectiveness implications. However, if targeted at 'almost active' populations and use existing infrastructures they may present an important opportunity.	Includes UK studies Relevance score: A
Murphy-Hoefer R et al 2005	Systematic review Level: 2	College/university student smokers	What is the efficacy of interventions designed to reduce the prevalence of smoking in	Results indicated that interventions can have a positive influence on student behaviour, specifically by reducing tobacco use (i.e. prevalence of cigarette smoking and use of smokeless products, amount smoked) among college students, and increasing acceptability of smoking policies	12 studies conducted in the US, 2 in Germany and 1 in Switzerland

	Review quality: + No. of studies: 14		college/university students?	and campus restrictions among tobacco users and nonusers. With individual level interventions quit rates were 23% (intervention group) 15% (control group) within 3 months, 36% and 16% respectively within 1 year and 13% and 9% respectively for quit by 3 months and abstinent at 1 year. With institutional level interventions Chaloupka (1997) found that the price of cigarettes and amount of tax on them had a significant negative impact on smoking by college students. 10% increase in price would reduce smoking participation by over 5% and consumption among smokers by 4.2% to 7.9%. Apel (1997) found that a smoke free policy led to led to 28% of men and 30% of women smoking less after introduction of the policy.	Relevance score: B
Nishi N, Jenicek M & Tatar K 1998	Systematic review (meta-analysis) Level: 1 Review quality: + No. of studies: 5	Smokers in group exercise programs.	What is the effect of group exercise programs on smoking cessation?	The summary odds ratio for the 3 studies whose main aim was smoking cessation was 2.35 (95% CI 0.75-7.31). When the 2 other studies, in which smoking cessation was not the main aim, were added the summary odds ratio dropped to 1.85 (95% CI 0.65-5.24). This indicates that exercise may be effective for aiding smoking cessation. Most studies were successful in increasing physical fitness of the intervention group. However, no detail is given of the successful interventions – why they might be successful in increasing chances of smoking cessation. Also, it is not explained exactly what the odds ratio’s mean – do they mean that if you exercise you are twice as likely to give up smoking? Or twice as many people give up smoking if they exercise concurrently? Finally, no detail is given of the differences between the studies whose main aim was/was not smoking cessation – what is important in smoking cessation then, as regards exercise?	Non-UK studies Relevance score: B
Ogilvie D et al 2004	Systematic review Level: 2 Review quality: - No. of studies: 22	Urban dwelling adults	What interventions are effective in promoting a population shift from using cars towards walking and cycling and what are the health effects of such interventions?	Some evidence was found that targeted behaviour change programmes can change the behaviour of motivated subgroups, resulting (in the largest study) in a shift of around 5% of all trips at a population level. Single studies of commuter subsidies and a new railway station also showed positive effects. The balance of best available evidence about publicity campaigns, engineering measures (extending and improving cycle route networks), and other interventions (such as financial incentives) suggests that they have not been effective. Participants in trials of active commuting experienced short term improvements in certain measures of health and fitness, but they found no good evidence on effects on health of any effective intervention at population level.	8 of the studies carried out in the UK Relevance score: A
Park E W et al 2004	Systematic review of randomised controlled	Smokers	Does an intervention to enhance partner support	An increase in quit rates was not detected. The odds ratio for self-reported abstinence at 6-9 months was 1.08 (CI 95% 0.81-1.44) and at 12	The review does not state which countries

	<p>trials</p> <p>Level: 1</p> <p>Review quality: +</p> <p>No. of studies: 9</p>		<p>help smoking cessation when added as an adjunct to a smoking cessation programme?</p>	<p>months post treatment was 1 (CI 95% 0.75 – 1.34%). 2 studies provided separate and comparable data for live married or equivalent to married partners. A sensitivity analysis for these 2 studies found that at 6-9months after treatment OR = 1.64 (95% CI 0.58-4.64, not significant). Of the 6 studies that measured partner support at follow up, only 2 studies reported significant increase in partner support in the intervention group.</p>	<p>the studies were conducted in.</p> <p>Relevance score: B</p>
<p>Peersman G, Harden A & Oliver S 1998</p>	<p>Systematic review</p> <p>Level: 1</p> <p>Review quality: +</p> <p>No. of studies: 50</p>	<p>Employed adults</p>	<p>How do we know what works in the field of social and behavioural interventions? What evidence is there for the effectiveness of different interventions?</p>	<p>Of the 50 studies only 15 were judged to be methodologically sound. No clear trends in effectiveness could be identified in relation to certain types of interventions, interventions focusing on particular areas of health, or interventions provided by particular categories of people, therefore conclusions about effectiveness can only be drawn from specific individual studies. Comprehensive programmes combining screening and risk assessment with a choice of education programmes and/or environmental changes have been effective; however with few sound studies to draw on, replicating these interventions cannot guarantee success. Least effective have been weight control programmes combining education and financial incentives; sustained weight loss appears particularly difficult and more effort is required to develop and evaluate interventions aimed at long-term weight control. There is no conclusive evidence for the effectiveness of social support provided by peers or group leaders as part of broad educational interventions. The effect of interventions incorporating a skill development component is inconclusive with equal numbers of effective and ineffective interventions; however, combining skills training with social support in interventions targeting a specific risk behaviour is more likely to be effective than skills training as part of broad complex interventions. Healthier eating has been encouraged by targeted provision of information, such as point of purchase labelling of healthy food choices in the workplace cafeteria, and computer-generated personalised nutrition advice. 2 complex interventions addressing healthy eating were considered ineffective: 1 operated at the level of individuals, organisations and communities; the other involved presentations, computerised data analysis, supermarket tours, take home activities and group walks. Individualised delivery of information appeared effective in a range of interventions. This finding was also supported by a process evaluation of a complex intervention suggesting that engaging the eager employees into wellness programmes was easy if programmes were provided on-site; engaging the reluctant employees required one to one approaches. The importance of healthy alliances was supported by a</p>	<p>94% of the studies were performed in North America, with less than 2% performed in the UK</p> <p>Relevance score: B</p>

				number of studies showing success in controlling blood pressure, smoking and alcohol consumption, as well as improving knowledge and changing behaviour related to cancer prevention; however, other studies involving healthy alliances had disappointing results.	
Petrella R & Lattanzio C 2002	Systematic review (including at least one RCT) Level: 2 Review quality: - No. of studies: 13	Healthy adults	What is the effect of counselling patients to become more physically active?	6 RCTs, 5 quasi-experimental studies 5 studies had 4-8 weeks follow-up, 8 were >6 months follow-up. A US project, INSURE, enrolled >2000 patients where GPs (with limited training and support) provided specific health services. After 12 months, 33.8% intervention group had begun exercising, compared to 24.1% control group (p<.05). Another US study gave 24 patients saw a physician for brief advice, had 15 mins of exercise training, and educational materials including a card with study protocol and supportive rationale. At 1-month follow-up intervention patients were exercising more frequently, intensively and for longer than control group. However, this is short follow-up period so cannot comment on the longer term effectiveness of this advice. An Australian study tested the effectiveness of adding self-help educational materials to lifestyle counselling using videos. A significant increase in total energy expenditure (kJ/kg/h) over 12 months was seen in both counselling and counselling + video material groups but no difference between the groups. A US study evaluated the effect of physician visits encouraging healthy behaviour in elderly people. No difference was found between intervention and control groups. A US study trained GPs to provide 3-5 mins of PA counselling to patients. Patients also received 'booster' phone calls 2 weeks in to reinforce the counselling. At 6-week follow-up 52% of intervention patients reported regular activity compared to 12% of control patients. They also significantly increased duration of walking compared with controls (+37 mins/week vs. +7 mins/week) and showed greater readiness to become active. Physicians were supportive of the program. Longer term efficacy needs evaluation. A US study tested efficacy of brief physician-delivered PA counselling. PA increased but no difference between intervention and control groups. Limitations include small sample size (n=63) and short term follow-up. An Australian study assessed effectiveness of brief physician intervention at routine consultations to increase PA in >400 sedentary patients. At 12-month follow-up no significant differences were found between intervention and control. A New Zealand study compared written and oral advice about PA in 37	UK-based studies included Relevance score: A

				GPs and 491 sedentary patients over 6 weeks. Increase in participation in, and amount of, PA was significantly greater in those who received written advice. Limitations include no detail of GP training, activity level assessed over only 2 weeks, no further follow up after 6 weeks. A Canadian study compared physicians who delivered PA counselling based on American College of Sport Medicine's guidelines of frequency, intensity and duration with physicians who also used a 'step test' which determines fitness level and appropriate training heart rate. The STEP group took longer to administer but resulted increased VO_2^{max} (measure of cardio-respiratory fitness) in STEP patients. A UK study of 714 patients found that it costs less to help sedentary patients become more active than to motivate pts to recommended levels of activity for improved health (this will cost more in time and resources but long-term savings had not been determined).	
Posavac E J, Kattapong KR & Dew D E 1999	Systematic review of experimental studies Level: 2 Review quality: - No. of studies: 47	Healthy adults	What are the effects of peer health education programmes?	<u>Peer interventions to avoid/reduce smoking:</u> No intervention provided to comparison group: mean effect size 0.101 (95% CI 0.033-0.169) <u>Alternative intervention provided to comparison group:</u> mean effect size 0.052, (95% CI -.016-0.089). <u>All interventions:</u> Effect sizes are larger at end of program (mean effect size 0.434, CI not reported) than at long-term follow up (6 to 12 months mean effect size = 0.160, over 48 months mean effect size = 0.077).	94% of studies were carried out in the USA Relevance score: B
Rice V H & Stead L F 2004	Systematic review (including at least one RCT) Level: 2 Review quality: + No. of studies: 29	Smokers	What are the effectiveness of nursing-delivered interventions regarding smoking cessation?	Smokers offered advice in nursing intervention were more likely to quit than those without (evidence from 20 trials, including 10289 participants: OR=1.47, 95%CI: 1.29-1.67), however, there was evidence of heterogeneity. Interventions effective for hospitalised and non-hospitalised participants. No evidence for a difference in benefit in terms of intervention delivery (evidence from 5 studies) or intensity of intervention	10 studies were conducted in the UK, with the majority conducted in Western countries (US, Canada, Australia) Relevance score: A
Roe L et al 1997	Systematic review of experimental studies Level: 2 Review quality: ++ No. of studies: 76	General population including children	What is the effectiveness of interventions to promote health eating in the general population?	<u>School/university:</u> 21 studies, of which 7 rated as good quality. Equal numbers showed beneficial effect and no effect on cholesterol level and dietary intake. 2 large scale, long-term randomised trials showed decreases in fat intake, but less so in lower-income school children. Longer and more frequent classroom contact associated with more sustained effect. <u>Effectiveness of parental involvement (evaluated by adding a home activity component to the intervention) was unclear. A large study</u>	UK studies were included in the review Relevance score: A

				<p>showed no effect, 1 moderate quality study found some effect but which was not sustained at one year, and another found an effect only in girls.</p> <p><u>Workplace</u>: 9 RCTs were directed at entire workplace populations (mainly male) of which 4 were good quality. The majority showed beneficial effects on dietary change (although outcomes often poorly measured). Secular trends and contamination between study & control groups limit the effects of some studies. The most effective interventions focussed solely on changing diet or blood cholesterol (rather than a range of lifestyle factors), and usually included individual screening or counselling. A conclusion from the most effective large-scale studies was that they need not be intensive, but require substantial workplace organisation and resource. For example, a reduction of fat intake of 1% energy was seen in an US intervention which consisted of workplace events, cholesterol screening, classes and cafeteria meal modification. Individual health screening among manual workers in Glasgow showed reduced blood cholesterol of 2.5%.</p> <p><u>Primary care</u>: 7 RCTs of which 4 were good quality. All interventions involved individual counselling or printed educational material, based on theoretical models. Individual tailoring of the intervention enhanced effectiveness. More intensive intervention to those at higher risk was associated with sustained reductions in blood cholesterol. 3 of the good quality studies were nurse-administered health checks in GP practices in UK. They showed that a single health check with a nurse, supplemented by take-home materials, brief follow-up and referral resulted in dietary changes and reduced blood cholesterol level or 2-3% in large populations (sustained for 3 years in one study). The fourth good quality study provided individually tailored computerised information, and resulted in reduced fat intake of 4% energy, but no change in fruit/vegetable intake. A moderate quality study found non-tailored educational materials found no effect on diet. Few interventions were conducted on younger adults, ethnic minorities and lower-income groups.</p> <p><u>Community</u>: 10 large-scale cohort studies and 6 RCTs; 7 were good quality. The long-term studies were consistent in showing no intervention effect on blood cholesterol (compared to the secular trend in control groups). 3 of the 4 good quality cohort studies showed 1-2% reduction in cholesterol; the fourth study showed 3% reduction in cholesterol in men only. 2 good quality RCTs involved highly selected and motivated participants who attended educational sessions and completed food records; large reductions in fat intake (10% energy) or cholesterol (7%) were seen in the short-term. There was a lack of</p>	
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				interventions in adolescents/younger adults, ethnic minorities and lower-income groups.	
Ryan P & Lauver D R 2002	Systematic review Level: 2 Review quality: - No. of studies: 20	Adults	What is the efficacy of tailored informational interventions (TIs) compared to standard informational interventions (SIs) and does efficacy vary by type of behaviour, use of feedback, type of delivery channel, dose of the intervention or time?	Studies were designed to change health behaviours related to nutrition (6 studies), smoking cessation (6), obtaining mammograms (5) and exercise (3). The health behaviour framework used most frequently was the transtheoretical model (15). Participants preferred TIs to SIs, perceived that the TIs were personal, and read and remembered more of the TI information. TIs were more effective than were SIs in 50% of studies. TIs had small increases in effect sizes compared to SIs. The efficacy of TIs differed by type of behaviour – some evidence indicated that TIs were more effective for changing dietary behaviours than for smoking or obtaining a mammogram. TIs had greater efficacy when ipsative feedback (comparing current to past behaviour) was included as part of the intervention than when the intervention did not include such feedback. Repeated versus single administration of TIs did not affect health behaviours. The efficacy of TIs changed over time in some studies, but the pattern of change was not consistent.	Studies were performed in the US, Belgium, Netherlands, and the UK. Relevance score: A
Secker-Walker RH, Gnich W & Lancaster T 2002	Systematic review (including at least one RCT) Level: 2 Review quality: + No. of studies: 34	Smokers	Do community-based interventions reduce smoking and which characteristics of these studies are related to their efficacy?	<u>Smoking prevalence</u> : Net decline in smoking prevalence per year (i.e. the decline in prevalence in the intervention groups minus that in the comparison groups) ranged from -1% to +3% per year in all adults (10 studies). For women the decline ranged from -0.2% to +3.5% per year (11 studies) and for men the decline rate ranged from -0.4% to +1.6%. <u>Attitudinal outcomes</u> : 1 out of 7 studies showed a net intervention effect, a significant progression through the stages of change. 1 other study showed net intervention effects for heavy smokers in the independent surveys and for light to moderate smokers in the cohort follow up, concerning smoking as a public health problem. <u>Quit attempts</u> : 1 out of 9 studies showed a significant net intervention effect. <u>Smoking environment</u> : 0/2 studies showed an intervention effect. <u>Reinforcing factors</u> : Neither of the 2 studies with pre and post intervention assessments of social pressures to quit showed a net intervention effect. In the one study with pre and post intervention assessments of social support for quitting smoking, there was no intervention effect. <u>Norms concerning smoking</u> : Of the 2 studies which assessed intervention effects on norms concerning smoking showed no intervention effect and the other showed a significant intervention effect for women smokers' perceptions of community norms but not for family or friends' norms. <u>Two most valid studies</u> (in terms of randomisation and power): These	Includes UK studies Relevance score: A

				<p>found no intervention effect for changes in smoking prevalence but a significant increase in quit rate was seen in one study and a significant increase in quit rate among men but not women was seen in the other study. This indicates success on an individual but not a community level. <u>Interventions most likely to be successful</u>: Intervention success was not related to the number of risk behaviours addressed, the setting of the intervention (e.g. urban vs rural), the theoretical basis of the intervention, the channel of delivery or the involvement of community members. The 4 projects lasting less than 2 years had no demonstrable effect but among those lasting 2 to 5 years or more than 5 years there was little difference in the proportion of studies reporting at least one favourable outcome. Significantly higher levels of exposure and higher participation rates tended to be associated with more favourable outcomes.</p>	
Serra C et al 2000	<p>Review of uncontrolled studies</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 11</p>	Smokers	What is the effectiveness of interventions to reduce tobacco consumption in public places?	<p><u>Strategies aimed at populations</u>: 6 studies in hospital or workplace. 2 hospital studies found significant effects of an institutional ban: a) A children's hospital saw reductions in people seen smoking (53% at baseline to 0% at 6-month follow up), numbers of cigarette butts in ashtrays and concentration of nicotine vapour in elevators (although no differences in restrooms and outpatient clinics). A similar intervention in an adult hospital found comparable results.</p> <p>An information campaign (signs, leaflets, displays) led to significant reductions in smoking in public areas of hospitals. A policy of restricting smoking to designated areas and times in a workplace setting significantly reduced the number of workers being bothered by people's smoke. One study evaluated warning signs; emphasising the harm of smoking had a larger impact than emphasising the benefit of quitting in cardiac inpatients, but no effect on visitors. Another study found no difference between negatively (threatening punitive action) and positively (non-threatening and courteous) worded signs, but both together appeared reduce the proportion of smokers compared to baseline.</p> <p><u>Strategies aimed at individuals</u>: In offices, continuous requests to stop smokers smoking had more effect than occasional requests. In a barbershop, a large reduction in smoking customers was seen when requests combined with signs. In supermarkets, requests showed higher effect than signs alone. In a university cafeteria, signs and verbal prompting together were more effective than several signs on tables/walls. Another study showed that assertive requests to stop smoking was dependent on the area; 39% stopped smoking after a</p>	<p>All included studies were conducted in the US.</p> <p>Relevance score: B</p>

				request in a recreational area, 75% in a non-recreational area, and 66% if the smoker was in the company of others. Most effective interventions are where institutions developed, resourced and supported programmes to ban smoking. High success rates from a strategy which included education, dissemination of information, training for managers and quitting support for smokers. Commitment from management and communication with those affected by the ban appeared to be an important part of successful interventions. Posted signs had little effect on their own; strategies aimed at individuals had short-term effect, and are unacceptable as public health strategies.	
Shepherd J et al 2001	Systematic review (including at least one RCT) Level: 3 Review quality: + No. of studies: 6 outcome evaluations, 8 qualitative studies	Young people aged 11- 16 years	What is the evidence from outcome and/or process evaluations of interventions to improve young people's nutrition? What are the views of young people on the barriers to and facilitators of healthy eating?	Whole school approach found to be effective for healthy eating behaviour, particularly in young women but difficult to identify key features of success. Increasing availability of healthy foods in schools, complemented by classroom activities and media campaigns has been effective for healthy eating behaviour. School based interventions educating young people about nutrition and alerting them to environmental influences upon their ability to eat healthy foods can be effective for healthy eating behaviour, particularly in young women. Multiple component interventions involving classroom activities, parental involvement and risk factor screening can be effective for certain clinical risk factors. Teaching cooking skills and motivating young people to promote healthy eating has been effective for increasing consumption of healthy foods and reducing blood pressure. Gender differences in effectiveness of interventions.	1/7 interventions conducted in the UK. Qualitative evidence taken from UK only. Some interventions carried out outside the UK have tested issues raised in these UK based qualitative studies. Relevance score: A
Sinclair H K, Bond C M & Stead L F 2004	Systematic review (including at least one RCT) Level: 1 Review quality: + No. of studies: 2	Smokers	What is the effectiveness of interventions by community pharmacy personnel to assist clients to stop smoking?	1 of the 2 trials demonstrated significant improvement in abstinence rates in the intervention group compared to control up to and including 12 months after the start of intervention. The other trial did not demonstrate statistically significant improvement but a trend towards improved abstinence with pharmacy intervention. Pharmacists valued their training received in both trials, and the training intervention had long-term benefits for the knowledge and attitudes of pharmacists and staff over the 3-year period.	Both recent (1998 and 2001) UK trials Relevance score: A

Sowden A & Stead L 2003	Systematic review (including at least one RCT) Level: 2 Review quality: - No. of studies: 17	Young people less than 25 years of age	What is the effectiveness of community interventions in preventing the uptake of smoking in young people compared to no intervention or other single component interventions (e.g. school based programmes)?	2 out of 12 studies comparing community wide interventions with no intervention controls, reported significant differences in smoking prevalence between the intervention and control groups. Both studies were part of community wide cardiovascular disease prevention programmes in all age groups. 2 out of 5 studies comparing community interventions to single component interventions reported significant differences between the intervention and control groups. The other 3 found no significant differences. The authors conclude that there is some limited support for the effectiveness of community interventions in preventing the uptake of smoking in young people.	Studies carried out in a range of countries including the UK. Relevance score: A
Stead LF & Lancaster T 2005	Systematic review (of RCTs) Level: 2 Review quality: - No. of studies: 55	Smokers	What is the effect of group-delivered behavioural interventions in achieving long-term smoking cessation?	A group programme was more effective than self help (OR 2.04, 95% CI 1.6-2.6) or no intervention (OR 2.17, CI 1.37-3.45). There was no evidence that group therapy was more effective than counselling or that it was effective as an adjuvant to nicotine replacement. There is limited evidence that more complex interventions involving skills training or cognitive therapy are more effective (OR 1.36, 95% CI 1.03-1.79). This analysis was sensitive to one large study with multiple components. Participation rates in group therapy varied between studies.	Only small proportion carried out in UK Relevance score: A
Stead L F & Lancaster T 2005	Systematic review (including at least one RCT) Level: 2 Review quality: - No. of studies: 34	Minors, defined as the legal age limit in the communities studied.	What are the effects of interventions to reduce underage access to tobacco by deterring shopkeepers from making illegal sales	<u>Does intervention with retailers lead to decreased sales to minors?</u> Interventions simply giving information to retailers is not effective. Successful educational interventions used a variety of strategies including personal visits and mobilising community support. Enforcement, or warnings of it, generally had an effect on retailer behaviour. Existing evidence suggests that to sustain compliance, checks must be carried out at least 4 to 6 times a year. A locking device policy on vending machines resulted in fewer locations selling cigarettes to minors but it was probably less effective than banning vending machines. <u>Do reduced sales of tobacco to minors lead to a reduction in minors' self-reported ease of access?</u> Results vary between studies. Reduction in sales not necessarily associated with self reported ease of access. <u>Do reduced sales of tobacco to minors decrease prevalence of tobacco use?</u> 4 out of 7 controlled trials and 2 out of 4 uncontrolled trials found evidence of an effect of intervention on youth smoking behaviour. The evidence suggests that in order to reduce smoking prevalence, compliance with not selling to minors has to reach a threshold level within a community (>80 %). However, this hypothesis needs to be	Studies included in the review were carried out in a range of English speaking countries. Only a small minority of studies were carried out in the UK. Relevance score: A

<p>Stead L F, Lancaster T & Perera R 2003</p>	<p>Systematic review (including at least one RCT)</p> <p>Level: 1</p> <p>Review quality: -</p> <p>No. of studies: 27</p>	<p>Smokers</p>	<p>What is the effect of telephone support to help smokers quit?</p>	<p>tested prospectively.</p> <p><u>Proactive + minimal intervention vs. minimal intervention</u> 13 trials, 10 of which the minimal intervention was self-help materials. In a meta-analysis there was evidence of a significant benefit from the addition of the telephone counselling component (OR 1.56). The results of this are supported by individual studies.</p> <p><u>Proactive + face-to-face vs. face-to-face</u> 4 studies, none of which showed a significant increase in quitting from the addition of telephone follow-up. Pooled estimate reflects this (OR 1.08).</p> <p><u>Proactive + NRT vs. NRT</u> 4 studies, none of which showed a statistically significant effect of adding telephone support (OR 1.08).</p> <p><u>Proactive vs. Group programme</u> 1 study showed no difference in 6-month sustained quit rates at 24-month follow up.</p> <p><u>Reactive: Help lines + self-help materials vs. self-help materials</u> 1 study showed some effect, 1 showed negative effect and one showed no effect.</p> <p><u>Reactive: Tailored responses to helpline calls</u> 2 studies failed to find a significantly increase benefit from tailored counselling or materials. Telephone counselling as the sole intervention or added to self help materials increases the odds of quitting (OR 1.56).</p> <p>Despite some guidelines recommending using telephone counselling to follow up face-to-face counselling, this review showed evidence that benefits from phone counselling were stronger when it was the main intervention rather than when it was used to support face-to-face. The better results achieved by dedicated phone support services could reflect a difference in provider skills. Or, that phone contact could encourage use of self-help materials.</p> <p>Timing may affect the impact of the intervention – may need calls during first few weeks of quit attempt when risk of relapse is higher.</p> <p>Other studies and reviews have shown that phone counselling as a follow-up to in-hospital counselling was effective.</p> <p>Rigorous review of reactive services is difficult due to reluctance to refuse help to some callers.</p> <p>1 suggested benefit of hotlines is that they can attract calls from specific minority groups by using targeted advertising. But well educated white women are overrepresented as users of telephone services for health care in general.</p> <p>Counselling via telephone hotlines can be provided as part of a programme or separately and give access to more people than face to face. The review of trials found telephone counselling is effective compared to a programme with no personal contact.</p>	<p>23/27 studies were from US. No UK studies included.</p> <p>Relevance score: B</p>
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				<p>As the main component of an intervention, proactive phone counselling increases the chances of quitting relatively by about 50%.</p> <p>Indirect evidence suggests receiving counselling via a quit line also has an increased change of successfully quitting.</p> <p>Phone quit lines provide an important route of access.</p> <p>Phone counselling as a follow-up to face-to-face counselling may lead to a small increase in success rates compared to face-to-face intervention alone, but evidence for this is weaker.</p>	
Stuart W P et al 2005	<p>Systematic review</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 17</p>	Overweight adolescents	<p>Which interventions were effective at producing adolescent weight loss?</p> <p>What are the scope and domain of structured interventions for adolescent weight loss?</p>	<p>5 methodological limitations emerged from the review: the absence of validation of study findings by replication; limited diversity in terms of participant ethnicity; unclear or nonsystematic approaches to parental participation; high attrition levels; and limited use of conceptual frameworks for intervention development.</p> <p><u>Types of interventions:</u> interventions included treatment with and without family members, interventions with and without exercise, interventions with dietary reductions, an intervention with Metformin to reduce glucose intolerance, the use of monetary reward structures, a telephone and mail-based behavioural intervention, and an intervention with sibutramine as an adjunct to therapy, diet and exercise. 13 of the studies used group interventions for behavioural change.</p> <p><u>Theoretical base:</u> only 1 study identified the theoretical framework used to guide the intervention as social cognitive theory.</p> <p><u>Parental participation:</u> studies suggest that there is a benefit in having parents attend a group separate from the adolescent.</p> <p><u>Exercise interventions:</u> school based interventions have achieved effective weight loss with combined lifestyle change education and exercise, as well as exercise only intervention.</p> <p><u>Dietary interventions:</u> findings from Sondike et al (2003) suggest that a low carbohydrate diet may achieve greater compliance with adolescents than low fat diets.</p> <p><u>Monetary rewards:</u> in a study by Coates et al (1982a) greater weight loss was achieved when cash incentives were provided more frequently. However Coates et al (1982b) found similar weight loss was achieved without financial incentive.</p> <p><u>Attrition and attendance rates:</u> attrition rates varied from 10-45%. One behavioural intervention study reported that participants (female adolescents) missed 43% of the sessions.</p> <p><u>Telephone and mail-based interventions:</u> Saelens et al (2002) although weight loss trends were noted in the intervention group and the comparison group demonstrated weight gain trends, a statistically</p>	<p>Location of the studies not reported but from reference list appear to be in American publications</p> <p>Relevance score: C</p>

				significant difference between the groups was not identified at follow-up. <u>Medication interventions:</u> Freemark & Bursey (2001) BMI was reduced by 1.3% in the group taking metformin, whereas the control group BMI increased 2.3%. Berkpwtiz et al (2003) reported that adolescents who took sibutramine combined with a behavioural, diet and exercise intervention, had a 4.5% greater BMI loss than those in the control group.	
Summerbell CD et al 2005	Systematic review (including at least one RCT) Level: 2 Review quality: + No. of studies: 22	Young people less than 18 years	To assess the effectiveness of interventions designed to prevent obesity in childhood through diet, physical activity and/or lifestyle and social support	22 studies were included, 10 long term (at least 12 months) and 12 short term (12 weeks to 12 months). 19 were school/preschool based, one was a community based intervention targeting low income families and 2 were family based interventions targeting non obese children of obese or overweight children. Nearly all studies resulted in some improvement in diet or physical activity. 6/10 long term studies combined dietary and physical activity interventions; 5 resulted in no difference in overweight status between groups and one resulted in improvements for girls receiving the intervention and not boys. 2 studies focussed on physical activity alone. Of these 1 appeared to be effective in preventing obesity and the other did not report sufficient data to determine whether there was a significant difference between the 2 groups, although from the data provided it is unlikely that the changes would be clinically significant. 2 studies focussed on nutrition alone but neither were effective in preventing obesity. 4/12 short term studies focused on interventions to increase physical activity levels and 2 of these resulted in minor reductions in overweight status in favour of the intervention. The other 8 studies combined advice on diet and physical activity but none had a significant impact on obesity. 4/12 short term studies focused on interventions to increase physical activity levels and 2 of these resulted in minor reductions in overweight status in favour of the intervention. The other 8 studies combined advice on diet and physical activity but none had a significant impact on obesity. There was an absence of cost effectiveness data in the primary studies reviewed. Some studies conducted in well educated population groups and families, limiting the generalisability of the findings and potentially widening the inequalities experienced.	A small proportion of studies carried out in the UK. Relevance score: A
Taylor WC, Baranowski T & Young D R 1998	Systematic review (including at least one RCT) Level: 2	Low income, ethnic minorities and populations with disability.	How effective are interventions that have targeted populations at risk of inactivity, including low income,	<u>Ethnic groups:</u> 2 interventions reported no significant changes in physical activity 2 reported mixed results i.e. changes in some outcomes but not all), two reported changes in subgroups and 2 reported consistent positive changes. The studies reporting positive, consistent change were both weight loss programmes for women. The final 2 studies did not	All studies identified were US based. There may be cultural differences to the UK.

	<p>Review quality: -</p> <p>No. of studies: 14</p>		<p>ethnic minorities and populations with disability?</p>	<p>report physical activity change.</p> <p><u>Disability:</u> All 4 studies showed improvement in physical activity.</p> <p><u>Income:</u> No studies concerning people with low income outside of ethnic minority groups were identified.</p>	<p>Relevance score: D</p>
<p>Tedstone AE, Aviles M & Shetty PS 1998</p>	<p>Systematic review (including at least 1 RCT)</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 14</p>	<p>Children: one to five year olds</p>	<p>What are the most effective methods to bring about dietary changes (to healthy diets) in 1-5 year olds?</p>	<p><u>Studies aimed at children in a preschool or day-care setting:</u> 2 studies used traditional teaching methods. 1 found an intervention effect on attitude but not knowledge. The other showed an intervention effect, on knowledge, attitude and choice of vegetables as snacks at preschool. In addition the latter study found a greater effect when the positive benefit of eating vegetables was emphasised rather than the negative effect of not eating vegetables. A third study assessed the effect of pro-nutrition video programmes. At the end of the intervention period children in the intervention group were more knowledgeable about nutrition than the control group. However, no differences were seen in food preference or food choice. A fourth study compared the effectiveness of traditional teaching methods with a computer based package. The study was carried out in 3 preschools, 1 from the children of university employees and two where priority was given to children from single parent low income families referred to from social services. Although no demographic information was collected, the researchers suggested that those at university preschool were likely to be of higher socioeconomic status than those at the community preschools. All groups increased their knowledge over the intervention period but those from the preschool with an assumed higher social class intake gained less knowledge than those from the preschools with lower social class intake. The computer intervention may therefore be more effective with lower social class children. 2 further studies used a behaviour modification approach. 1 assessed the effectiveness of giving rewards for consuming healthy drinks. At the end of the intervention period the experimental group consumed less healthy drinks than the control group. The other study investigated the effects of repeated exposure on willingness to consume initially novel foods. The results showed a direct relationship between food exposure frequency and food taste preference for children that had been allowed to taste foods during the exposure. If the foods had only been looked at and smelt but not tasted, no association was found.</p> <p><u>Studies aimed at children that combine preschool and home settings:</u> A preschool nutrition intervention programme of 3-4 year old children from predominantly white middle income families increased the knowledge of the child. The effect was augmented by parental involvement.</p> <p><u>Studies aimed at children that compared preschool and home settings:</u> A</p>	<p>13/14 studies carried out in the USA. Welfare interventions in the USA may not be generalisable to the UK as the welfare system is very different.</p> <p>Relevance score: A</p>

				<p>nutrition education programme significantly improved knowledge in both preschool and home settings. Knowledge gain was significantly higher in the preschool to home setting.</p> <p><u>Studies aimed at children in a home setting:</u> A nutrition education programme tested in children from middle to upper socioeconomic background increases understanding of health and nutrition as related concepts.</p> <p><u>Studies aimed at carers in combined primary-care and home settings:</u> A study in the UK targeted mothers of children from a deprived low-income background in inner city Bristol. Mothers were provided with advice on the food components of a healthy diet and related organisational skills including meal planning, regular meals and eating together. At the end of the intervention period a 7 day food diary showed an overall improvement in the children's diet, organisation of meals, mothers' report of own and child's diets and a small improvement in self esteem.</p> <p><u>Welfare scheme studies aimed at carers in the USA:</u> 2/2 studies were found to be effective.</p> <p><u>Healthy eating promotions aimed at day care staff:</u> A single workshop for day care meal providers had no impact on menu plans provided by day care centres (controlled trial).</p>	
Thomas R 2002	<p>Systematic review (including at least one RCT)</p> <p>Level: 1</p> <p>Review quality: +</p> <p>No. of studies: 76</p>	Children aged 5- 18 years at school	<p>Are school programmes, characterised by intervention type more effective than minimal or no intervention in preventing smoking?</p> <p>Are different types of intervention characterised by theoretical orientation (e.g. social influences vs. information giving)?</p> <p>What effect does the method of delivery e.g. length of programme, peer vs. researcher/teacher led have?</p>	<p>No high quality studies measured information alone vs. control. Studies comparing information alone to other interventions found information alone to be less effective.</p> <p>The majority of school based interventions have been based on social influences. The results have been conflicting with 8 high quality studies showing positive effect on smoking prevalence and seven not showing effect. 1 not showing effect has been considered the most rigorous undertaken in terms of quality, duration and rigorous evaluation. However it has been criticised for not including key components which have been incorporated into successful programmes and for focussing on White run schools only.</p> <p>1 good quality study found that social competence (e.g. improved behaviour) without an anti smoking intervention lead to lower rates of smoking amongst boys but not girls.</p> <p>There is a lack of good quality evidence assessing combinations of social competence and social influences. There is limited conflicting evidence to assess whether school interventions in combination with wider interventions are effective.</p> <p>Few studies compared different formats of intervention; no good quality</p>	<p>A small proportion of studies carried out in UK.</p> <p>Relevance score: A</p>

				studies compared peer with teacher delivery or age, gender or culture specific interventions with standardised interventions.	
Thompson R et al 2003	Systematic review (including at least one RCT) Level: 1 Review quality: ++ No. of studies: 12 (including 13 comparisons)	Healthy adults	In adults, what is the relative efficacy of dietary advice given by a dietician compared with another health professional, or using self-help resources in reducing blood cholesterol?	For short-term effects (<9weeks): Dietary advice from a dietician was more effective than advice from a doctor in reducing blood cholesterol (effect size small but significant: -0.25mmol/L; CI -0.37, -0.12mmol/L). No evidence for difference between dietician and self-help resources. No differences observed for secondary outcomes (e.g. LDL/HDL cholesterol, body weight etc). When doctor, nurse, counsellor and self-help resources were combined and compared with dietician, dietician advice was found to be more effective in reducing blood cholesterol.	Included 2 UK studies (most US; all developed/Western countries). Relevance score: A
van Berkel TFM et al 1999	Systematic review Level: 2 Review quality: - No. of studies: 29, 10 of which related to smoking cessation interventions	Patients with coronary heart disease.	What is the impact of smoking cessation on prognosis and on smoking intervention trials in patients with coronary heart disease?	In 6/10 studies a significantly higher number of quitters was found in the intervention group, in 2 more quitters were found in the intervention group but this was not significant and in 2 studies no difference was found. Sequential meta analysis of the 10 studies resulted in 61% quitters in the intervention group and 42% in the control group, thus 19% more quitters were observed if an intervention was offered (OR=0.5, 95% CI = 0.41 – 0.61). None of the less effective studies had MI as an inclusion criteria	1/10 UK based Relevance score: A
van Teijlingen et al 1998	Systematic review Level: 2 Review quality: + No. of studies: 10 reports, 9 studies	Pregnant women	Do women of childbearing age and women who are pregnant change their dietary knowledge, attitudes and/or behaviour in response to specific interventions? What is the extent of such changes (if any)? What are the characteristics of interventions (if any) which appear to be effective?	5 studies were in women of childbearing age and 4 in women who were pregnant. Of these 7 were RCTs, 1 was a non-randomised, controlled before and after study and in the other it was unclear whether the control group was allocated randomly or not. Many of the studies were subject to bias, particularly lack of observer blinding, and using assessment tools of unknown validity. All 5 interventions assessed in women of childbearing age were community based; 2 appeared to be predominantly educational (1 involving a video supplemented by printed material, the other involving a series of nutrition lessons), 2 involved an exercise programme (1 strength training alone, the other as part of a wider intervention also involving education and peer support) and 1 was described as offering empowerment and support to new mothers. The duration of these interventions varied from a single session to regular meetings for at least a year. Taken together the studies suggest that participants can improve their	Includes 2 UK studies Relevance score: A

				<p>knowledge and dietary intake, particularly fat intake, and that the changes are statistically significantly greater in groups receiving an intervention compared with the controls. Insufficient data were obtained to comment on whether the changes are sustained. This, along with the diversity of the interventions and methodological flaws in some of the evaluations make it difficult to identify interventions which are likely to be successful if more widely applied.</p> <p>Of the 4 interventions in pregnant women, 2 were community based and 2 were clinic based. All had an educational component and in 3 this was enhanced by counselling and/or psychosocial support of varying degrees. 1 of the interventions involved distributing printed material at the clinic booking appointment and mailing a second pack at 26 weeks gestation; the others consisted of a number of contacts throughout the second half of pregnancy.</p> <p>Only 1 study in pregnant women provided specific outcome data in relation to a healthy diet as defined in this review; it had adequate statistical power and demonstrated small improvements in both control and intervention groups, with a greater, but statistical non-significant, improvement in the intervention group. This study also evaluated changes in knowledge and attitudes and demonstrated small changes in the desired direction in control and intervention groups; the difference in knowledge scores between the groups reached statistical significance but the magnitude of the difference is unlikely to represent an improvement which is worthwhile in practice. The other 3 studies suggested that pregnant women appear to improve their intake of energy and possibly protein in response to interventions designed to improve pregnancy outcomes, but they did not provide data on other components of a healthy diet or on knowledge or attitudes. Taken together it is not possible to conclude whether or not healthy eating interventions in pregnancy are effective.</p>	
Wantland D J et al 2004	<p>Systematic review (including at least one RCT)</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 22</p>	Healthy adults	What are the patient/client knowledge and behavioural change outcomes after Web-based interventions as compared to outcomes seen after implementation of non Web-based interventions?	<p>Of the 17 studies assessing knowledge/behavioural change outcomes, 16 revealed improved knowledge and/or behavioural outcomes for P's using web-based interventions, of which 6 were statistically significant (the one study favouring non-Web based intervention was not statistically significant). Effect sizes ranged from small (.01 to .19: 6 studies), moderate (.20 to .47: 5 studies) to moderately large (.54 to .75: 5 studies). There was no relation between the length of an intervention and its outcome effect size.</p> <p>5 studies comparing assessment instruments/methods when administered to web-based and non web-based groups revealed 2 studies showing</p>	<p>Not clear, no discussion in paper.</p> <p>Relevance score: B</p>

				<p>moderate negative effect sizes favouring the paper-based/traditional format (-.24 and -.22), neither of which were statistically significant. The remaining 3 studies showed small to moderate positive effect sizes (range of .17 to .44), only one of which was statistically significant. Most studies did not discuss ethnicity, income level or homelessness. In studies which reviewed their Web site statistics, there was large variability in the average intervention time and the number of logons to the sites. The average session time was 19.3 minutes. Interventions which directed the patient to relevant, individually tailored materials reported longer website session times per visit and more visits. Those which incorporated chat rooms showed increased social support scores.</p>	
White M, Carlin L & Rankin J 1998	<p>Systematic review (including at least one RCT)</p> <p>Level: 2</p> <p>Review quality: +</p> <p>No. of studies: 40 papers (reporting 29 studies)</p>	Minority ethnic groups	What is the effectiveness of nutritional health promotion in minority ethnic groups?	<p><u>One-to-one or small group counselling or education in home or clinic setting</u> 3 studies were found to be effective, 2 ineffective and 3 inconclusive (no UK studies). 2 'one-to-one' interventions failed to distinguish efficacy between different ethnic groups, and a third found that the intervention was effective in both black and white Ps.</p> <p><u>Classroom education in community or public centre (adult)</u> 3 studies were effective, 5 partially effective and 4 inconclusive (all USA studies)</p> <p><u>Community-wide intervention</u> 1 study partially effective, 4 inconclusive (no UK studies)</p> <p><u>Supplementation/fortification in clinic setting</u> 2 studies effective (both UK)</p> <p><u>School-based interventions (children)</u> 1 study effective, 7 partially effective, 3 ineffective and 2 inconclusive (no UK studies)</p>	<p>Only 2 of the studies were conducted in the UK and 23 out of 29 were conducted in the US.</p> <p>Relevance score: A</p>

APPENDIX 8: References of reviewed papers

Academic and Public Health Consortium 2005, “*An assessment of brief interventions and referral for smoking cessation in primary care and other settings with particular reference to pregnant smokers and disadvantaged groups with consideration of the tailoring and targeting of interventions.*”, London: National Institute for Health and Clinical Excellence.

Ammerman, A., Lindquist, C., Hersey, J., Jackman, A.M., Gavin, N.I, Garces, C., Lohr, K.N., Cary, T.S. & Whitener, B.L. 2001, *The efficacy of interventions to modify dietary behavior related to cancer risk*, Rockville: Agency for healthcare research and quality.

Ammerman, A.S., Lindquist, C.H., Lohr, K.N. & Hersey, J. 2002, "The efficacy of behavioral interventions to modify dietary fat and fruit and vegetable intake: A review of the evidence", *Preventive medicine*, vol. 35, no. 1, pp. 25-41.

Ashenden, R., Silagy, C. & Weller, D. 1997, "A systematic review of the effectiveness of promoting lifestyle change in general practice", *Family Practice*, vol. 14, No.2, pp. 160-175.

Ashworth, N.L., Chad, K.E., Harrison, E.L., Reeder, B.A., & Marshall, S.C. 2005, *Home versus center based physical activity programs in older adults*”, The Cochrane database of systematic reviews, issue 1.

Bessell, T.L., McDonald, S., Silagy, C.A., Anderson, J.N., Hiller, J.E. & Sansom, L.M. 2002, "Do Internet interventions for consumers cause more harm than good? : a systematic review", *Health Expectations*, vol. 5, no. 1, pp. 28-37.

Bize, R., Burnand, B., Mueller, Y. & Cornuz, J. 2005, *Biomedical risk assessment as an aid for smoking cessation*”, The Cochrane Database of Systematic Reviews Issue 4.

Blenkinsopp, A., Anderson, C. & Armstrong, M. 2003, "Systematic review of the effectiveness of community pharmacy-based interventions to reduce risk behaviours and risk factors for coronary heart disease", *Journal of Public Health Medicine*, vol. 25, no. 2, pp. 144-153.

Blue, C.L. & Conrad, K.M. 1995, "Adherence to worksite exercise programs: an integrative review of recent research", *American Association of Occupational Health Nurses Journal*, vol. 43, no. 2, pp. 76-86.

Brunner, E.J., Thorogood, M., Rees, K. & Hewitt, G. 2005, *Dietary advice for reducing cardiovascular risk*, The Cochrane Database of Systematic Reviews, Issue 4.

Brunton, G., Harden, A., Rees, R., Kavanagh, J., Oliver, S. & Oakley, A. 2003, *Children and physical activity: a systematic review of barriers and facilitators*, London: The Institute of Education, University of London.

Christakis, D.A., Garrison, M.M., Ebel, B.E., Wiehe, S.E. & Rivara, F.P. 2003, "Pediatric smoking prevention interventions delivered by care providers: a systematic review", *American journal of preventive medicine*, vol. 25, no. 4, pp. 358-362.

Ciliska, D., Miles, E. O'Brien, M.A., Turl, C., Tomasik, H.H., Donovan, U. & Beyers, J. 2000, "The effectiveness of community interventions to increase fruit and vegetable consumption in people four years of age and older", *Journal of Nutrition Education*, vol. 32, no. 6, pp. 341-352.

Contento, I., Balch, G.I, Bronner, Y.L., Lytle, L.A., Maloney, S.K., Olson, C.M., & Swadener, S. S. 1995, "The effectiveness of nutrition education and implications for nutrition education policy, programs, and research: a review of research", *Journal of Nutrition Education*, vol. 27, no. 6, pp. 277-422.

Contributors to the Cochrane Collaboration and the Campbell Collaboration 2000, *Evidence from systematic reviews of research relevant to implementing the 'wider public health' agenda.*, York: NHS Centre for Reviews and Dissemination.

Cyarto, E.V, Moorhead, G.E. & Brown, W. J. 2004, "Updating the evidence relating to physical activity intervention studies in older people", *Journal of science and medicine in sport*, vol. 7, no. 1 (Suppl), pp. 30-38.

DeHaven, M.J., Hunter, I.B., Wilder, L., Walton, J.W. & Berry, J. 2004, "Health Programs in Faith-Based Organizations: Are They Effective?", *American Journal of Public Health*, vol. 94, no. 6, pp.1030-1036.

Dishman, R.K. & Buckworth, J. 1996, "Increasing physical activity: A quantitative synthesis", *Medicine and science in sports and exercise*, vol. 28, no. 6, pp. 706-719.

Dobbins, M., Lockett, D., Michel, I., Beyers, J., Feldman, L., Vohra, J. & Micucci, S. 2001, "The effectiveness of school-based interventions in promoting physical activity and fitness among children and youth: a systematic review", Ontario: Public health research, education and development program.

Edwards, N., Aubin, P. & Morrison, M. 2000, *The effectiveness of postpartum smoking relapse prevention strategies* Ontario: Public Health Research, Education and Development Program.

Engbers, L.H., van-Poppel, M.N.M., Paw, M.& van Mechelen, W. 2005, "Worksite Health Promotion Programs with Environmental Changes: A Systematic Review", *American journal of preventive medicine* , vol. 29, no. 1, pp. 61-70.

Eysenbach, G., Powell, J., Englesakis, M., Rizo, C. & Stern, A. 2004, "Health related virtual communities and electronic support groups: systematic review of the effects of online peer to peer interactions", *British Medical Journal*, vol. 328, no. 7449, pp. 1166-1170.

Fletcher, A. & Rake, C. 1998, *Effectiveness of interventions to promote healthy eating in elderly people living in the community: a review*, London: Health Education Authority.

- Foster, C. & Hillsdon, M. 2004, "Changing the environment to promote health-enhancing physical activity", *Journal of Sports Sciences*, vol. 22, no. 8, pp.755-769.
- Gepkens, A. & Gunning-Schepers, L.J. 1996, "Interventions to reduce socioeconomic health differences. A review of the international literature", *European Journal of Public Health*, vol. 6, pp. 218-226.
- Gorin, S.S. & Heck, J.E. 2004, "Meta-analysis of the efficacy of tobacco counseling by health care providers", *Cancer Epidemiology Biomarkers & Prevention*, vol. 13, no. 12, pp. 2012-2022.
- Hajek, P., Stead, L.F., West, R., Jarvis, M. & Lancaster, T. 2005, *Relapse prevention interventions for smoking cessation*", The Cochrane Database of Systematic Reviews Issue 1.
- Harden, A., Weston, R. & Oakley, A. 1999, *A review of the effectiveness and appropriateness of peer-delivered health promotion interventions for young people*, London: Evidence for Policy and Practice Information and Co-coordinating Centre.
- Hey, K. & Perera, R. 2005, *Competitions and incentives for smoking cessation*, The Cochrane Database of Systematic Reviews, issue 2.
- Hey, K. & Perera, R. 2005, *Quit and Win contests for smoking cessation*, The Cochrane Database of Systematic Reviews, issue 2.
- Hider, P. 2001, *Environmental interventions to reduce energy intake or density: a critical appraisal of the literature*, Christchurch: New Zealand health technology assessment the clearing house for health outcomes and health technology assessment.
- Hillsdon, M., Thorogood, M., Anstiss, T. & Morris, J. 1995, "Randomised controlled trials of physical activity promotion in free living populations: A review", *Journal of Epidemiology and Community Health*, vol. 49, no. 5, pp. 448-453.
- Jepson, R. 2000, *The effectiveness of interventions to change health-related behaviours: a review of reviews* Glasgow: MRC Social & Public Health Sciences Unit.
- Kaper, J., Wagena, E. J., Severens, J.L. & van-Schayck, C.P. 2005, *Healthcare financing systems for increasing the use of tobacco dependence treatment*, The Cochrane Database of Systematic Reviews Issue 1.
- Ketola, E., Sipilä, R. & Mäkelä, M. 2000, "Effectiveness of individual lifestyle interventions in reducing cardiovascular disease and risk factors", *Annals of medicine*, vol. 32, pp.239-251.
- Kramer, M. S. & Kakuma, R. 2003, *Energy and protein intake in pregnancy*, The Cochrane Database of Systematic Reviews Issue 4.
- Krummel, D.A., Koffman, D.M., Bronner, Y., Davis, J., Greenlund, K., Tessaro, I., Upson, D. & Wilbur, J. 2001, "Cardiovascular health interventions in women: What works?", *Journal of Women's Health and Gender Based Medicine*, vol. 10, no. 2, pp. 117-134.

- Lancaster, T. & Stead, L. F. 2005a, *Individual behavioural counselling for smoking cessation*, The Cochrane Database of Systematic Reviews, Issue 2.
- Lancaster, T. & Stead, L. F. 2005b, "Self-help interventions for smoking cessation", *The Cochrane Database of Systematic Reviews*, Issue 3.
- Lancaster, T. & Stead, L.F. 2004, *Physician advice for smoking cessation* The Cochrane Database of Systematic Reviews, Issue 4.
- Lawlor, D.A. & Hanratty, B. 2001, "The effect of physical activity advice given in routine primary care consultations: a systematic review", *Journal of Public Health Medicine*, vol. 23, no. 3, pp. 219-226.
- Lawrence, D., Graber, J.E., Mills, S.L., Meissner, H.I & Warnecke, R. 2003, "Smoking cessation interventions in US racial/ethnic minority populations: an assessment of the literature", *Preventive medicine*, vol. 36, no. 2, pp. 204-216.
- Lumley, J., Oliver, S.S., Chamberlain, C. & Oakley, L. 2004, "*Interventions for promoting smoking cessation during pregnancy*", The Cochrane Database of Systematic Reviews, Issue 4.
- McArthur, D.B. 1998, "Heart healthy eating behaviors of children following a school-based intervention: a meta-analysis", *Issues in Comprehensive Pediatric Nursing*, vol. 21, no. 1, pp.35-48.
- McBride, C.M., Emmons, K.M. & Lipkus, I.M. 2003, "Understanding the potential of teachable moments: The case of smoking cessation", *Health education research*, vol. 18, no. 2, pp.156-170.
- McDonald, P., Colwell, B., Backinger, C.L., Husten, C. & Maule, C.O. 2003, "Better practices for youth tobacco cessation: Evidence of review panel", *American journal of health behavior*, vol. 27, supplement 2, pp. S144-S158.
- McLean, N., Griffin, S., Toney, K. & Hardeman, W. 2003, "Family involvement in weight control, weight maintenance and weight-loss interventions: A systematic review of randomised trials", *International Journal of Obesity*, vol. 27, no. 9, pp. 987-1005.
- Moher, M., Hey, K. & Lancaster, T. 2005, *Workplace interventions for smoking cessation*, The Cochrane Database of Systematic Reviews, Issue 2.
- Morgan, O. 2005, "Approaches to increase physical activity: reviewing the evidence for exercise-referral schemes", *Public health*, vol. 119, no. 5, pp. 361-70.
- Murphy-Hoefler, R., Griffith, R., Pederson, L.L., Crossett, L., Iyer, S.R. & Hiller, M.D. 2005, "A review of interventions to reduce tobacco use in colleges and universities", *American journal of preventive medicine*, vol. 28, no. 2, pp. 188-200.
- Nishi, N., Jenicek, M., & Tataru, K. 1998, "A meta-analytic review of the effect of exercise on smoking cessation", *Journal of Epidemiology*, vol. 8, no. 2, pp. 79-84.

- Ogilvie, D., Egan, M., Hamilton, V. & Petticrew, M. 2004, "Promoting walking and cycling as an alternative to using cars: Systematic review", *British Medical Journal*, vol. 329, no. 7469, pp. 763-766.
- Park, E.W., Tudiver, F., Schultz, J.K. & Campbell, T. 2004, "Does Enhancing Partner Support and Interaction Improve Smoking Cessation? A Meta-Analysis", *Annals of Family Medicine*, vol. 2, no. 2, pp. 170-174.
- Peersman, G., Harden, A. & Oliver, S. 1998, *Effectiveness of health promotion interventions in the workplace: a review*, London: Health Education Authority.
- Petrella, R.J. & Lattanzio, C.N. 2002, "Does counseling help patients get active? Systematic review of the literature", *Canadian Family Physician*, vol. 48, pp. 72-80.
- Posavac, E.J., Kattapong, K.R. & Dew, D.E. 1999, "Peer-based interventions to influence health-related behaviors and attitudes: a meta-analysis", *Psychological Reports*, vol. 85, no. 3 Pt. 2, pp. 1179-94.
- Rice, V.H. & Stead, L.F. 2004, *Nursing interventions for smoking cessation*, The Cochrane Database of Systematic Reviews Issue 1.
- Roe, L., Hunt, P., Bradshaw, H. & Rayner, M. 1997, *Health promotion interventions to promote healthy eating in the general population: a review*, London: Health Education Authority.
- Ryan, P. & Lauver, D. R. 2002, "The efficacy of tailored interventions", *Journal of Nursing Scholarship*, vol. 34, no. 4, pp. 331-337.
- Secker-Walker, R.H., Gnich, W., Platt, S. & Lancaster, T. 2002, *Community interventions for reducing smoking among adults*", The Cochrane Database of Systematic Reviews Issue 3.
- Serra, C., Cabezas, C., Bonfill, X. & Pladevall-Vila, M. 2000, *Interventions for preventing tobacco smoking in public places*", The Cochrane Database of Systematic Reviews Issue 3.
- Shepherd, J., Harden, A., Rees, R., Brunton, G., Garcia, J., Oliver, S. & Oakley, A. 2001, *Young people and healthy eating: a systematic review of research on barriers and facilitators*" London: Evidence for Policy and Practice Information and Co-ordinating Centre.
- Sinclair, H. K., Bond, C. M. & Stead, L. F. 2004, *Community pharmacy personnel interventions for smoking cessation*", The Cochrane Database of Systematic Reviews Issue 1.
- Sowden, A. & Stead, L. 2003, *Community interventions for preventing smoking in young people*, The Cochrane Database of Systematic Reviews, Issue 1.
- Stead, L. F. & Lancaster, T. 2005a, "Group behaviour therapy programmes for smoking cessation" *The Cochrane Database of Systematic Reviews*, Issue 2.

Stead, L. F. & Lancaster, T. 2005b, *Interventions for preventing tobacco sales to minors*, The Cochrane Database of Systematic Reviews Issue 1.

Stead, L.F., Lancaster, T. & Perera, R. 2003, *Telephone counselling for smoking cessation*, The Cochrane Database of Systematic Reviews Issue 1.

Stuart, W.P., Broome, M.E., Smith, B.A. & Weaver, M. 2005, "An integrative review of interventions for adolescent weight loss", *Journal of School Nursing*, vol. 21, no. 2, pp. 77-85.

Summerbell, C.D., Waters E., Edmunds, L.D., Kelly S., Brown, T. & Campbell K. J. 2005, "Interventions for preventing obesity in children (review)", *The Cochrane Database of Systematic Reviews*, Issue 3.

Taylor, W.C., Baranowski, T. & Young, D.R. 1998, "Physical activity interventions in low-income, ethnic minority, and populations with disability", *American journal of preventive medicine*, vol. 15, no. 4, pp. 334-343.

Tedstone, A.E., Aviles, M., Shetty, P.S. & Daniels, L. A. 1998, *Effectiveness of interventions to promote healthy eating in preschool children aged 1 to 5 years*, London: Health Education Authority.

Thomas, R. 2002, *School-based programmes for preventing smoking*, The Cochrane Database of Systematic Reviews, Issue 2.

Thompson, R.L., Summerbell, C.D., Hooper, L., Higgins, J.P.T., Little, P.S., Talbot, D. & Ebrahim, S. 2003, *Dietary advice given by a dietitian versus other health professional or self-help resources to reduce blood cholesterol*", The Cochrane Database of Systematic Reviews Issue 3.

van Berkel, T.F., Boersma, H., Roos-Hesselink, J.W., Erdman, R.A. & Simoons, M.L. 1999, "Impact of smoking cessation and smoking interventions in patients with coronary heart disease", *European Heart Journal*, vol. 20, no.24, pp. 1773-1782.

van Teijlingen, E., Wilson, B., Barry, N., Ralph, A., McNeill, G., Graham, W. & Campbell, D. 1998, *Effectiveness of interventions to promote healthy eating in pregnant women and women of childbearing age: a review*, London: Health Education Authority.

Wantland, D.J., Portillo, C.J., Holzemer, W.L., Slaughter, R. & McGhee, E.M. 2004, "The effectiveness of web-based vs. non-web-based interventions: A meta-analysis of behavioral change outcomes", *Journal of Medical Internet Research*, vol. 6, no. 4, pp. e40.

White, M., Carlin, L., Rankin, J. & Adamson, A. 1998, *Effectiveness of interventions to promote healthy eating in people from ethnic minority groups: a review*" London: Health Education Authority.