

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

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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

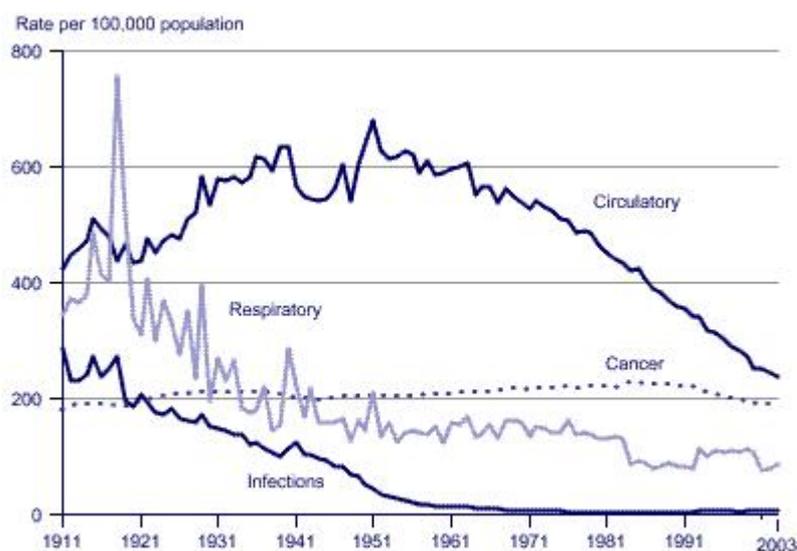
The average life expectancy for men and women living in England rose from about 50 years in 1900 to about 75 years for men and 80 for women in 2000. These gains were in large part due to decreases in infant mortality. In 1899 B. Seebohm Rowntree found, in a pioneering study of the population of York, 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)	
Written/telephone/ email/web			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.

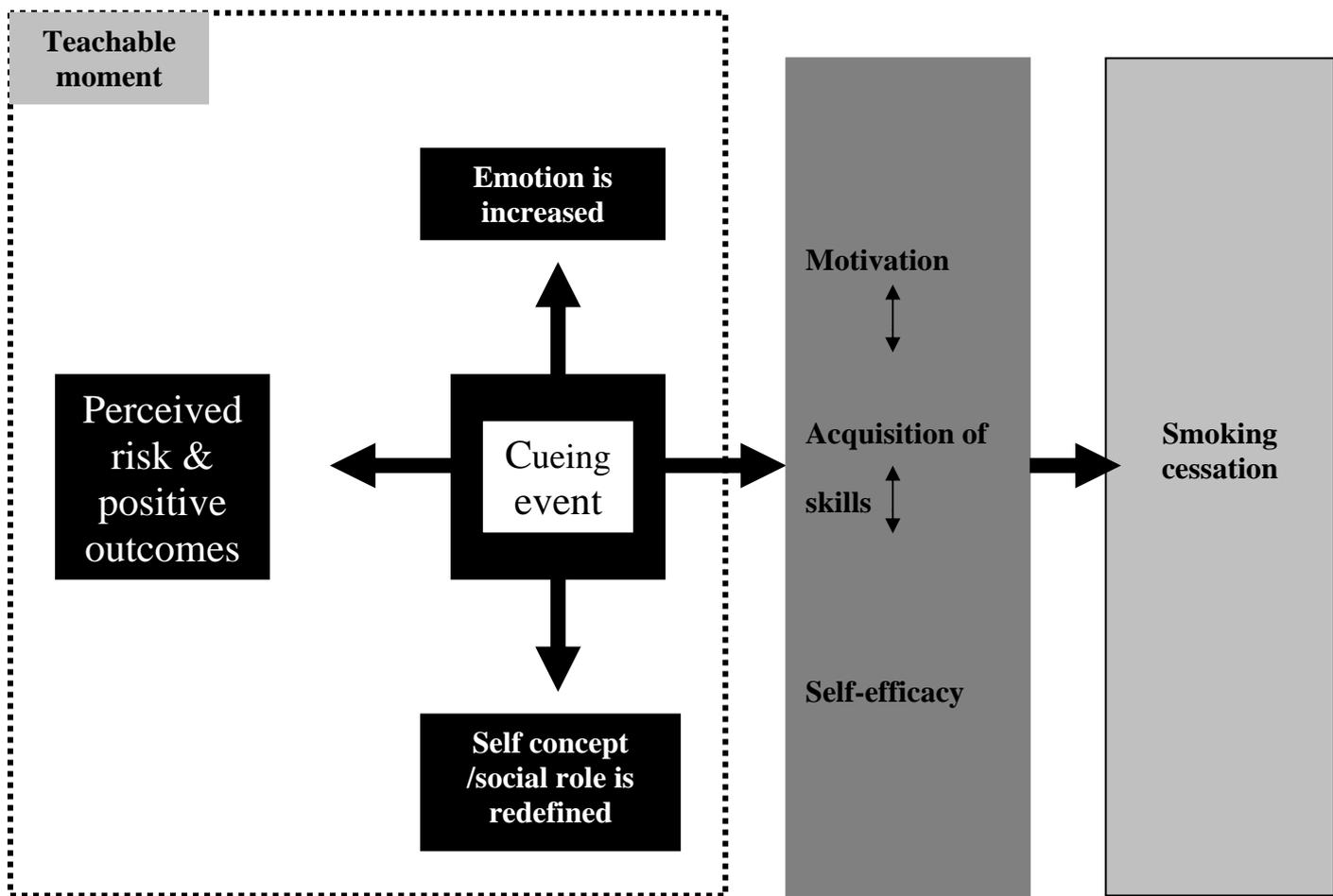


Figure 2. Heuristic model for a Teachable Moment in the smoking cessation context
 Source: McBride et al 2003

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.