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Incentives to improve smoking, physical activity, dietary and weight management behaviours

A scoping review of the research evidence

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REPORT

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CONTENTS

Summary

There is considerable academic, policy and practice interest in the use of incentives to improve a range of health outcomes, but especially those related to smoking, healthy eating, physical activity, obesity and weight management. However, there is uncertainty about the level of the published research literature that evaluates the effectiveness of incentives to address these health behaviours.

Researchers at the EPPI-Centre conducted a scoping review of the research literature to assess the extent and nature of the research literature on incentives. One hundred and twenty-eight records of trials, RCTs and systematic reviews were identified. This indicates that there is a considerable body of research concentrated on this topic. The literature was fairly evenly split between those that targeted smoking behaviours and those that addressed weight, diet and activity issues. The majority of studies evaluated financial incentives, though other material incentives were also identified. While 27 systematic reviews were identified there remain some noticeable gaps in the evidence base, and implications for future research are suggested.

Implications

Consideration should be given to commissioning a full in-depth systematic review of incentive-focused reviews for improving health outcomes.

Consideration should be given to commissioning systematic reviews of primary research in the following areas:

- Incentives for smoking cessation in disadvantaged populations
- Incentives for smoking cessation in pregnancy
- Incentives for weight loss in overweight and obese populations

1 Background

Increasing positive health behaviours in areas such as physical activity and healthy eating, weight management and smoking is of increasing policy importance. One potential method for encouraging healthy behaviours is the use of 'incentive' or 'reward' schemes. We use the term 'incentives' in this study to include a wide range of financial and non-financial rewards e.g. prizes, payment, gifts, material support, free or reduced cost access to leisure facilities, and deposit schemes. Interventions that use incentives may take place in a variety of locations (e.g. schools, households, the workplace, healthcare settings).

The Darzi report (Department of Health 2008) highlights the potential for incentives to recognise, reward and improve quality of care and service in the NHS. EPPI-Centre researchers have recently conducted scoping and systematic reviews of incentive schemes to increase positive health and other social behaviours in young people (Kavanagh et al. *in press,* 2006, 2005; Trouton et al. 2005), the Kings Fund conducted a literature review of financial incentives (Jochelson 2007), and a new Centre for the study of Incentives in Health at the London School of Economics has been established.[1] This group also administers a new JISCMail group on the topic of health incentives.[1] There are two Cochrane reviews of smoking cessation that evaluate incentives in specific situations: one is of 'Quit and Win' contests (Cahill and Perera 2008a), and one is of competitions and incentives for smoking cessation (Cahill and Perera 2008b).

The Department of Health is keen to ensure that, where possible, strategies to improve the health of the public are evidence-based. The EPPI-Centre, therefore, conducted this scoping exercise of the evidence-base in this area. Particular attention has been given to identifying evaluations which may impact upon health inequalities.

[1] http://www.lse.ac.uk/collections/LSEHealth/CSI.htm and https://www.jiscmail.ac.uk/cgi-bin/webadmin?A0=HEALTH-INCENTIVES

2 Aims and methods

2.1 Aims

The aim of this scoping review was to identify the nature and extent of the research literature evaluating the effectiveness of incentives provided to encourage healthy behaviours related to smoking, diet, physical activity and healthy weight maintenance across the population.

Scoping reviews differ from systematic research maps or full systematic reviews in that they are limited to a preliminary assessment of the potential scope and size of the relevant research literature. This scoping review has been undertaken to give policymakers an overview of the current international research literature. It does not contain synthesised findings or an assessment of the quality of the literature it identifies.

2.2 Methods

2.1.1 Inclusion criteria

For the purposes of this review incentives were defined as:

> *Any tangible benefit externally provided with the explicit intention of promoting pre-specified health behaviour changes in the direct or indirect recipient of the intervention. Examples of incentives include access to a range of free or reduced cost health and leisure facilities, prizes, payments and pledging (i.e. where the participant gives money to be put aside which is returned if the health goal is achieved).*

To be included in the scoping exercise, records of research had to meet all of the following criteria:

- Incentives were a central component of the intervention being evaluated (i.e. studies using incentives only to improve recruitment to a study, rather than to impact on its outcomes, were not eligible)
- They evaluated the effectiveness of incentive schemes on relevant health outcomes (weight management, physical activity levels, improved diet, smoking, access to leisure / sports facilities)
- They used an appropriate study design (e.g. systematic review of effectiveness, randomised control trial, other trial with a comparison group)
- Have been published in the previous 10 years
- Have an abstract in the English language

2.1.2 Identifying the research evidence

Search strategies were developed which captured the concepts in the inclusion criteria, and built on previous EPPI-Centre systematic reviews on incentives, healthy eating, physical activity, obesity in children and young people. Refer to Appendix 1 for complete search strategies. Searches were conducted across the following bibliographic databases, websites and research registers for research published in the last 10 years.

- Cumulative Index to Nursing & Allied Health (CINAHL Plus)
- DoPHER (Database of Promoting Health Effectiveness Reviews)
- Education Resources Information Center (ERIC)
- Google Scholar
- International Bibliography of Social Science (IBSS)
- PsycINFO
- PubMed
- Scirus
- Social Policy and Practice
- Social Science Citation Index (SSCI)
- The Cochrane Library
- TRoPHI (Trials Register of Promoting Health Interventions)

Records of research were uploaded to the specialist web-based systematic review software EPPI-Reviewer (Thomas and Brunton 2006), for duplicate stripping, screening, descriptive coding and analyses. The results of this scoping review are based on information taken from the title and abstract of records of published research identified in our searches. Full text copies of studies identified through screening were not retrieved.

2.1.3 Describing the research evidence

Following application of the inclusion criteria at the screening stage, all remaining relevant records of research were descriptively coded according to the following criteria:

- Study design
- Country of origin
- Health focus
- Characteristics of the population (e.g. age, gender, socio-economic status, 'at risk')
- Outcomes for which results are presented
- Type of incentive (e.g. prizes, outings, cash payments)
- Features of the intervention (e.g. single or multiple component intervention, incentive given to participate in programme or contingent on change, negotiated incentive)
- Intervention site (e.g. school, outreach, primary care)
- Provider of intervention (e.g. teacher, health promotion practitioner

2.3 Strengths and limitations of a scoping review

Though a scoping review uses some of the features and stages of a systematic review it does so in a more limited fashion. As the aim is to assess the potential nature and size of a body of research literature, it does not aim to be fully exhaustive in its searching, and thus there were minimal attempts to identify grey or hard to identify literature. Hand searching, contact with authors, reference checking and citation chasing were not undertaken. Full text copies were not obtained, and no attempt was made to assess the quality of the research or extract and synthesise findings. These limits mean that it would be inappropriate to use the findings to generate recommendations for policy and practice.

The benefits of a scoping review are that they can be undertaken in a relatively short time with few resources, and still provide a systematic and transparent assessment of the extent of a body of research evidence. A scoping review should indicate what the outstanding and leading issues might be and identify potential gaps in the knowledge base. The results can be used to assess whether a full systematic review is warranted and what the resource implications might be.

3 Results

3.1 Identification of relevant studies

Searches of bibliographic databases, research registers and websites identified 4454 potentially relevant records of published research. After screening these records, 128 separate studies were judged to be relevant and were coded descriptively. The analysis presented here is based on the descriptive codes we applied to the available title and abstracts, apart from those studies also included in an ongoing review of smoking cessation in pregnancy where full reports and complete data extractions were available (see section 3.3).

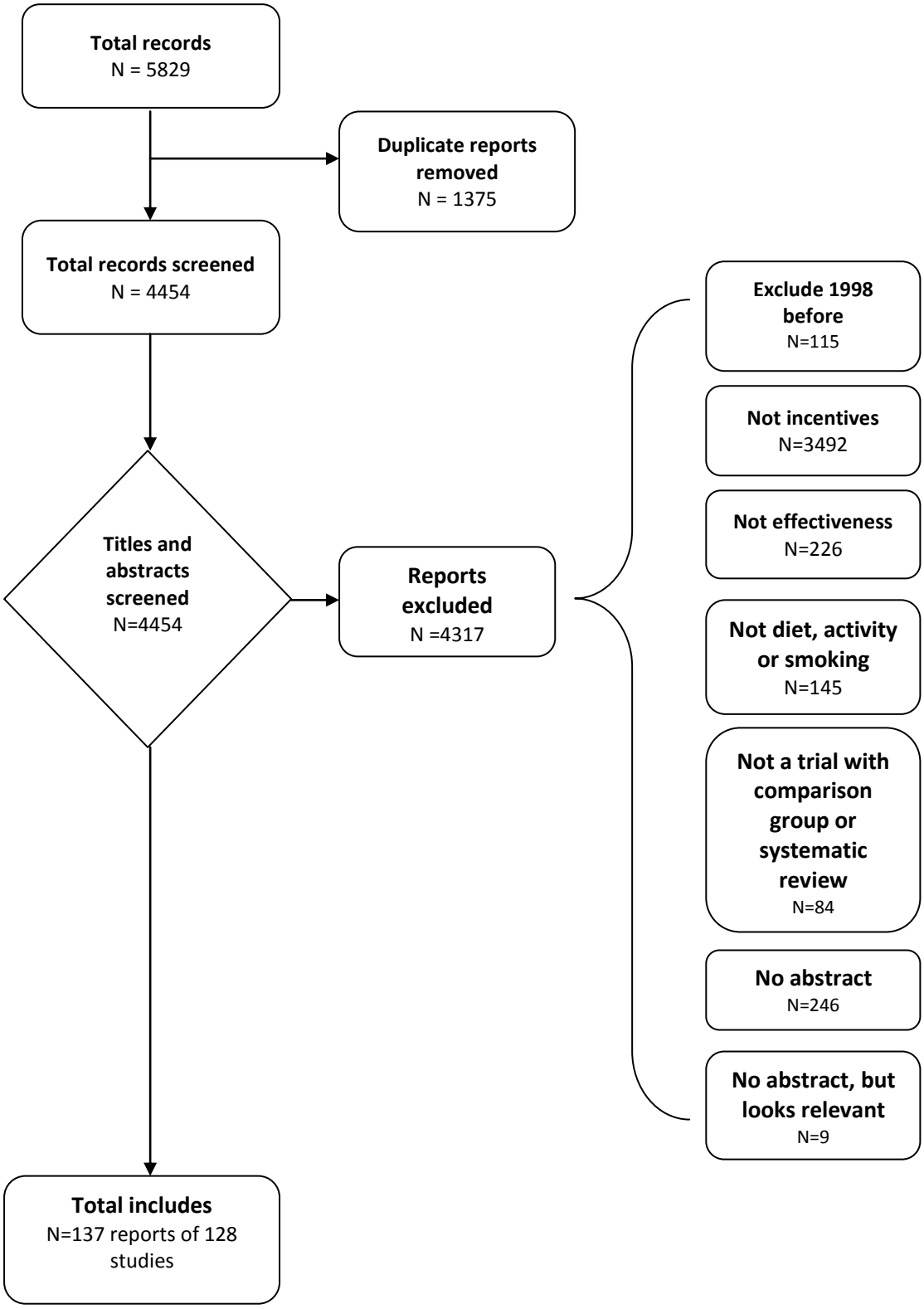
The flow of literature through the searching and screening process is illustrated in Figure 3.1.

3.2 Characteristics of included research

3.2.1 Study type

Nearly half of the studies (N=58) were randomised controlled trials (RCTs), 39 were non-randomised controlled trials. For a further four studies there was insufficient information to confirm what type of controlled study they were and it is possible that these may be cohort studies. We also identified 27 systematic reviews.

Figure 3.1 Flow of literature through the review



3.2.2 Country of origin

Table 3.1 shows the different countries in which the studies were conducted. This information was only available in 53 of the research records for the 128 studies included. In the remainder, there was either insufficient information in the research records to ascertain in what country the research had been undertaken, or they were records of systematic reviews of international research. Of those studies with information on the country of research origin, 13% (N=7) were conducted in the UK, and 55% (N=31) were conducted in the USA. These proportions are similar to those in a previous systematic review of incentives schemes (Kavanagh et al. 2006).

Table 3.1: Country of origin (reported in 53 studies; some overlap)

Country	Number	%
USA	29	55
UK	7	13
Germany	3	5
Mexico	3	5
The Netherlands	2	4
Australia	1	
Africa	1	2
Brazil	1	2
Canada	1	2
Low and middle income countries (not specified)	1	2
Honduras	1	2
Ireland	1	2
South Africa	1	2
Taiwan	1	2

3.2.3 Focus of the studies

Table 3.2 shows the health focus of the 128 studies. The numbers do not add up to 128 or percentages to 100 as many studies had more than one focus (for example, some studies had a focus on both obesity and physical activity, and a number of studies were of workplace health promotion interventions).

The largest single coherent body of research, with half of the studies (50%, N=64), was focused on the role of incentive based interventions to encourage smoking cessation or reduction. Physical activity, healthy eating and/or obesity were a focus for 57 (43%) of the included research studies. There was some overlap between these foci, for example, half of the studies (N=10) with a focus on obesity also evaluating aspects of physical activity. Ten studies (8%) did not have a central focus on smoking, obesity, diet, or physical activity. Of these, five were systematic reviews of general health promotion and prevention; the remainder were trials and RCTs which either considered cardiovascular health promotion or generalised health promotion and prevention activities.

Thirteen studies were targeted towards economically disadvantaged populations who are more likely to suffer from inequalities in the health outcomes this scoping review addresses. The studies, five of which were set in low or middle income countries, aimed their interventions explicitly at population groups that were identified as low income or living in neighbourhoods with high levels of deprivation. Sixteen studies focused on pregnancy, all of which considered smoking cessation to some degree and these will be discussed in more detail later. Eleven studies considered the role of the workplace in addressing health behaviours. A few studies also had an additional focus on drug and alcohol abuse or people with existing health conditions such as diabetes.

Table 3.2: Health focus of studies (N=128 overlapping categories)

Focus	Number	%
Tobacco	64	50
Healthy eating	31	23
Physical activity	26	20
Health promotion	20	16
Obesity	20	15
Pregnancy	14	11
Health inequalities	13	10
Workplace	11	8
Parenting	6	5
Cardiovascular	5	4
Alcohol	3	2
Drugs	3	2
Medical care	2	2
Diabetes	2	2
Cancer	1	1
Education system	1	1

3.3 Analysis by health focus

The body of literature identified in this scoping review falls into two distinct categories: research evaluating incentives in relation to smoking cessation and reduction (N=64); and research evaluating incentives in relation to the overlapping topics of obesity, physical activity and healthy eating or diet (N=61). There was little overlap between the two groups, five studies did not fall into either group: four were reports of systematic reviews of incentives for general preventive health behaviours, and the fifth was a study of incentivised improvements to housing which measured health and socio-economic impact. Given this we present all further analyses by these two categories, and also describe in more detail the systematic reviews we have identified.

3.3.1 Smoking cessation and prevention

Intervention recipients

Among the 64 studies which focused on smoking cessation and prevention, 42 (66%) included adults, 15 (23%) young people, 15 (23%) the general population and two (3%) included children. The two studies which included children aimed to prevent children initiating smoking in families where the parents were smokers. Studies which were directed towards the general population were often mass media interventions, for example encouraging people to access smoking cessation services, or were systematic reviews. Nine studies (14%) focused on women only, all of which were related to smoking in pregnancy, whereas only one study targeted male smokers. Seven studies (11%) explicitly addressed people who had low incomes or were from economically deprived communities; one of these was a systematic review of smoking cessation interventions to reduce the rates of premature death in disadvantaged areas through proactive case finding, retention and access to services (Bauld et al. 2007). However this review did not focus explicitly on incentive-based interventions.

Incentives can be delivered to populations at different levels: directly to the individual, to a group (e.g. a whole school class), and at the organisational, regional and national level. The vast majority of studies evaluated incentives which were delivered to individuals (N=40, 63%). Seventeen (27%) studies evaluated interventions delivered at the group or organisational level, seven of these evaluated interventions given to groups of health care providers in a range of settings, with five incentivising groups of workers; two were delivered at the classroom and two at the family level. For the remaining studies there was insufficient information to judge at what level the intervention was provided. No systematic reviews appeared to focus on evaluating the role of incentives provided at a group or organisational level.

Type of incentive and other intervention characteristics

Incentives were mostly contingent on behaviour change or other outcome (N=39, 61%), with 18 (28%) not being contingent on any behaviour but given as an aid or encouragement to quitting or reducing smoking. Studies with non-contingent incentives were often assessing the role of access to free or reduced cost nicotine replacement therapy (NRT) or other benefits, or were studies which compared the effectiveness of contingent and non-contingent approaches. Incentives were used as elements of complex multi-component interventions in 11 (17%) of the smoking studies, with 38 studies (60%) evaluating the role of incentives in single or dual component interventions, the number of intervention components was unclear in the remaining 15 (23%) studies.

Financial incentives (including cash, vouchers, and competitions) were the most commonly reported among a broad range of methods (N=47, 73%), though many studies (N=12, 19%) did not report what the incentive was. More than half of the incentives involved a cash payment (N=25, 39%) which varied greatly in terms of the amount given, from 50 cents for each anti-smoking prescription given by a clinician (Hovell et al. 2001) to $5000 for every 50

referrals made by health care providers to a smoking 'quit line' (An et al. 2008). At the individual level, the value of cash incentives varied from $10 to $300. Twenty of these studies provided the incentive contingent on behaviour change; five were non-contingent, with three studies comparing contingent and non-contingent approaches. Cash incentives were infrequently an element of a complex intervention with multiple components, with the majority (N=20), being part of a single or dual component intervention.

Thirteen studies evaluated incentives in the form of participants being given an opportunity to win cash or other prizes by being entered into a competition or lottery. Four of these were systematic reviews (Smedslund 2004; Cahill and Perera 2008a; 2008b, O'Connor et al. 2006). Eleven of the 13 studies were contingent on behaviour change. Vouchers were given in 12 studies and were exchangeable for a range of items from stores and other locations, though in many cases it was not clear what they could be exchanged for or where they could be exchanged. Like cash incentives, vouchers were rarely used as part of a complex multi-component intervention. Free or reduced cost NRT and anti-smoking drugs were given in five studies; in two others, health care professionals were given free training in smoking cessation techniques alongside other incentives. Two of the three studies which evaluated gifts as incentives were targeted towards pregnant women. Pledging, in the form of a deposit contract, was evaluated in one very small RCT, and referred to in one systematic review. We found no studies which evaluated incentives for sustained behaviour change.

Table 3.3 Type of incentive (N=64 studies; overlapping categories)

Type of incentive	Number	%
Cash payments	25	39
Entry into competition / raffle / lottery/ prizes	13	20
Unclear / Not reported	12	19
Vouchers	12	19
Gifts	3	5
Free /reduced cost NRT or anti-smoking medication	5	8
Other free or reduced cost benefits	2	3
Pledging	2	3

Evaluation characteristics

Smoking behaviour outcomes were mostly measures of reductions in smoking, and the length of duration of complete abstinence, with a few studies measuring intentions to quit, and relapse rates. Twenty-five studies reported biochemically confirmed abstinence outcomes. The length of follow up for outcome measures was reported in 39 (61%) of the research records and ranged from five days to three years (N=1). Forty records of studies (63%) reported the number of study participants, which ranged from 8 to over 16,000 (in a cluster randomised trial of 154 orthodontist practices). There was an approximate mean of 380 participants in the trials and RCTs of individuals; at least four studies were cluster trials or cluster RCTs and reporting of numbers of clusters and individual participants was not always clear.

Incentives for smoking cessation in pregnancy

Nine of the primary studies in this scoping review are of pregnant women, five of which are also included in an ongoing re-analysis of a Cochrane review of interventions for smoking cessation during pregnancy (Lumley et al. 2009) which is currently being conducted at the EPPI-Centre and with other review authors in Australia. In this section we provide more information on these five studies as we have access to data extractions based on the full reports. Four other studies published prior to 1999, and therefore not included in this report, were identified as incentive-based interventions in our re-analysis of the Cochrane data and are mentioned here for completion (Sexton and Hebel 1984; Lowe et al. 1997; Walsh et al. 1997; Albrecht et al. 1998). We identified no systematic reviews which evaluate the use of incentives to increase smoking cessation in pregnant women, however the 13 studies identified would be potentially relevant to such a review.

Six of the nine studies were delivered to women with low socio-economic position. Vouchers were issued as incentives in six studies (with one also providing vouchers to the participant's chosen 'social supporter'. Two studies provided gifts, and two provided cash payments. Participants' smoking status was biochemically validated in five of the studies.

3.3.2 Obesity, physical activity, diet and weight management

Intervention recipients

In terms of groups of people included in the studies which evaluated the use of incentives to tackle obesity, physical activity, diet and weight management behaviours, 33 of the 61 studies (56%) included adults, 12 (20%) young people, 14 (32%) children, and 11 (17%) the general population. A third of the studies (N=19, 24%) focused on females only, with the remainder including mixed sex populations, and no studies targeting males only. Fifteen studies (25%) explicitly evaluated the use of incentives in low income populations of which three were systematic reviews; two off nutritional interventions with women with an emphasis on improving levels of healthy eating in pregnant and non-pregnant women, and one of nutrition and physical activity interventions with low income populations. The remaining 12 studies varied in their focus and outcomes, and there was no coherent group of studies which appeared to focus on obesity or weight management. Six studies evaluated interventions in minority ethnic populations, all of which were conducted in the USA. Overweight or obese populations were targeted in 13 (22%) of the interventions evaluated. The majority of the studies (N=34, 58%) evaluated incentives provided to individuals. Studies which provided incentives at the group or organisational level tended to be delivered to families and households, or classes of school children; or to whole schools and workplaces.

Type of incentive and other intervention characteristics

Only 38 (63%) of the 61 studies reported whether incentives were given contingent on behaviour change or achieving a particular goal; sixteen were contingent and 22 non-contingent. From the information provided it was not possible to see any obvious trends in the characteristics of studies in relation to type of contingency. In those records of research where there was sufficient information to make a judgement, incentives were used as

elements of complex multi-component interventions in 11 (17%) of the 59 studies, with 25 (41%) studies evaluating the role of incentives in single or dual component interventions.

There was a broad range of incentives provided with financial incentives being the most common. Many (N=24, 39%) did not report the nature of the incentive (see Table 3.4). A quarter of the incentives involved a cash payment (N=15, 25%), though the amount was not frequently reported; when it was reported, the amount ranged from $50 to $150. Cash incentives were split evenly between contingent and non-contingent interventions, and, where reported, cash payments were rarely part of a complex multi-component intervention. Seventeen studies evaluated people's access to free or reduced cost resources as an incentive (29%); six of these evaluated the provision of free or reduced cost access to leisure and sports facilities (including, in one study, access to a personal trainer). Other reduced cost resources were mainly food-related with no studies providing increased access to healthier food stuff (e.g. in snack vending machines in school), or reduced cost healthy produce (e.g. in staff canteens); one study provided new mothers with a sports stroller, and one other compared lower cost health insurance with a cash incentive. Vouchers were all exchangeable for health food items in different settings (e.g. local farmers market, supermarket), apart from one study which provided vouchers for accessing sport and leisure facilities, and two which were unclear. No studies evaluated the use of pledging or deposit contract schemes, or the use of incentives for sustained behaviour change.

Table 3.4 Type of incentive (N=61 studies; some overlap between categories)

Incentive	Number	%
Unclear / Not reported	23	39
Cash payments	15	25
Free / reduced cost resources – other	11	19
Vouchers	9	15
Free or reduced cost access to leisure / sports facilities	6	10
Gifts	2	3
Token economy	1	2

Evaluation characteristics

Changes to people's diet and their intake of healthy foods was the most common outcome used to assess effectiveness (N=28, 46%). This was measured in a wide variety of ways, including the use of food diaries, questionnaires, increases or reductions in sales of different food stuffs and occasionally biochemical tests (e.g. measures of serum beta-carotene or cholesterol). Twenty-two studies (37%) measured changes to physical activity in various ways including number of sessions of moderate to vigorous activity and a range of fitness scores. Only six studies measured both physical activity and healthy eating outcomes. Twenty-four studies (40%) measured BMI or body weight and these studies are discussed in more detail below.

The length of follow up for outcome measures was reported in 31 (53%) of the research records and ranged from four weeks (N=2) to six years (N=2). The most frequently reported follow-up periods were: two years, and 12 months (N=6 each), six months (N=5) and 18 months (N=3). Forty-two records of studies (69%) reported the number of study participants, which ranged from 21 to over 5000. There was a mean of approximately 600 participants in the trials and RCTs of individuals; ten studies were cluster trials or cluster RCTs and reporting of numbers of clusters and individual participants was not always clear.

Incentives for body weight changes

While increases in levels of physical activity and healthy eating might be expected to result in weight-loss, only twenty-four (41%) studies used BMI or other measures of body weight to assess the impact of interventions (fourteen of these also measured changes in levels of physical activity or healthy eating). Five of these were systematic reviews, three of which focussed on obesity and weight loss, though only one of these concentrated on incentive based interventions, and this was limited to financial incentives with adults (Paul-Ebhohimhen and Avenell 2008). Three of the nineteen primary studies were of incentive-based interventions to improve nutrition in low and middle income countries and the emphasis was on weight gain rather that weight loss. At least nine of these studies targeted groups of people who were already obese or overweight rather than general population groups.

3.3.3 Existing systematic reviews

We located reports of 27 literature reviews. While we describe these as 'systematic reviews' it should be noted that we did not have access to their full reports and did not assess their methodological quality; it is possible, therefore, that they are not all full systematic reviews. Appendix 3 provides details of the reviews, grouped by those which included only incentive based interventions (N=12), and those where incentives were evaluated alongside non-incentive based interventions (N=15).

The reports included nine systematic reviews on interventions to change cigarette smoking behaviours. Six of these focused on the use of incentives, of which three were targeted at the general population and one (Higgins et al. 2002) focused on substance abusers, pregnant and recently postpartum women, adolescents, and those with serious mental illness. Kavanagh and colleagues (2006) evaluated the use of incentives on smoking and other behaviours in young people. Three of these four reviews examined particular types of incentive. Another five reviews on smoking behaviours referred to incentive interventions, amongst other interventions. Three of these five concerned initiatives taking place in the workplace, another looked at low socio-economic groups (Bauld et al. 2007), and Jepson and colleagues (2006) studied interventions on young people, pregnant smokers and difficult-to-reach communities.

Three reviews assessed financial incentives for either weight loss or changing dietary behaviour in the general population (Paul-Ebhohimhen and Avenell 2008; Wall et al. 2006; Goodman and Anise 2006). A further eight reviews of interventions for weight control and

improving dietary and fitness outcomes included incentives among a range of other interventions. These varied in population focus and the type of incentive was often unclear from the abstract.

The use of incentives for improving a range of health behaviours was the subject of four reviews. Three of these concerned financial incentives for the general population, of which one focused on low and middle-income countries. In one review, Kavanagh and colleagues (2005) looked at incentive schemes for improving health and other social behaviours in young people. A further two reviews on interventions for health promoting behaviours in the workplace had incentives amongst their included interventions.

4 Discussion and implications

The results of this scoping review indicate that there is a considerable body of international research on the effectiveness of incentives for a range of health behaviours. We identified 27 potentially systematic reviews, eleven of which concentrate on the potential of incentives to improve health. This is a large body of review level evidence and worthy of evaluating in its own right. We know of no existing review of incentive reviews and this may be a fruitful area for future research, particularly to confirm what appear to be the gaps in the systematic review level evidence base in this area.

Tackling inequalities in health is a UK government priority and increasingly a global priority, and smoking is negatively associated with low socio-economic status. Whilst there have been reviews which look at a range of interventions to reduce smoking in low SES and other disadvantaged populations (Bauld et al 2007; Jepson et al. 2006), we identified no systematic reviews which focused on the use of incentives in low SES populations, but did identify a review which focused on people with substance abuse problems (Higgins et al. 2002).We identified eight primary studies which evaluated the impact of incentives on smoking cessation and were targeted at low socio-economic populations. Given that this is a scoping review and our analyses based on abstract alone it is likely that this is an underestimate of the number of studies that actually focused on these populations.

Smoking in pregnancy is strongly linked to adverse birth outcomes including low birthweight, preterm birth and perinatal death (Hammoud et al. 2005; Salihu and Wilson 2007; US DHHS 2004). Incentives have been shown to be effective in reducing smoking during pregnancy (Lumley et al. 2009); however we identified only one systematic review that considered incentive-based interventions (vouchers) for smoking cessation with this population (Higgins et al. 2002). We did identify 13 primary studies in this area, seven of which we are in the process of analysing for a re-analysis of data in the smoking cessation review by Lumley and colleagues (2009).

Like smoking, obesity is negatively associated with low SES, and brings with it a range of poor health outcomes. We found only one systematic review which specifically evaluated the role of incentives to reduce obesity and this was limited to financial incentives with adults (Paul-Ebhohimhen and Avenell 2008). We identified 16 primary studies which evaluated a range of incentives and measured their impact on BMI or other measures of body weight to assess the impact of intervention effectiveness on weight loss. Nine of these studies were of overweight obese populations.

Implications

Consideration should be given to commissioning a full in-depth systematic review of incentive focused reviews for improving health outcomes.

Consideration should be given to commissioning systematic reviews of primary research in the following areas:

- Incentives for smoking cessation in disadvantaged populations
- Incentives for smoking cessation in pregnancy
- Incentives for weight loss in overweight and obese populations

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Trouton A, Kavanagh J, Oakley A, Harden A, Powell, C (2005) *A summary of ongoing activity in the use of incentive schemes to encourage positive behaviours in young people*. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.

Walsh RA, Redman S, Brinsmead MW, Byrne JM, Melmeth M (1997) A smoking cessation program at a public antenatal clinic. *American Journal of Public Health* 87: 1201-1204.

Appendix 1: Search Strategies

Cumulative Index to Nursing & Allied Health (CINAHL Plus)

Interface: EBSCO host
Date: 9 July 2009
Hits: 615
Publication Years: 1999-2009;
Language: English
Search modes: Boolean/Phrase

S1 (MH "Clinical Trials") or (MH "Nonrandomized Trials") or (MH "Community Trials") or (MH "Pretest-Posttest Control Group Design") or (MH "Pretest-Posttest Design+") or (MH "Experimental Studies+") or (MH "Crossover Design") or (MH "Quantitative Studies") or (MH "Quasi-Experimental Studies+") or (MH "Meta Analysis") or (MH "Evaluation Research") or (MH "Health Services Research") or (MH "Outcomes Research") or (MH "Health Policy Studies") or (MH "Policy Studies") or (MH "Literature Review+") or (MH "Systematic Review") or (MH "Random Assignment")
S2 (MH "Placebos")
S3 TI "meta-analysis" or AB "meta-analysis"
S4 TI "systematic overview" or AB "systematic overview"
S5 TI systematic* W2 synthes* or AB systematic* W2 synthes*
S6 TI meta-ethnography or AB meta-ethnography
S7 TI systematic* narrati* or AB systematic* narrati*
S8 TI review W4 literature or AB review W4 literature
S9 TI synthesis W4 results or AB synthesis W4 results
S10 TI evidence W3 review or AB evidence W3 review
S11 TI evidence W3 review or AB evidence W3 review
S12 TI random* or AB random*
S13 TI (trial or trials) or AB (trial or trials)
S14 TI control* N8 study or AB control* N8 study
S15 TI control* N8 studies or AB control* N8 studies
S16 TI prospect* W5 studies or AB prospect* W5 studies
S17 TI prospect* W5 study or AB prospect* W5 studies
S18 TI evaluation stud* or AB evaluation stud*
S19 TI placebo or AB placebo
S20 TI RCT or AB RCT
S21 S1 or S2 or S3 or S4 or S5 or S6 or S7 or S8 or S9 or S10 or S11 or S12 or S13 or S14 or S15 or S16 or S17 or S18 or S19 or S20
S22 (MH "Life Style, Sedentary") or (MH "Physical Activity") or (MH "Physical Fitness") or (MH "Exercise+") or (MH "Leisure Activities") or (MH "Recreation") or (MH "Sports") or (MH "Diet+") or (MH "Weight Reduction Programs") or (MH "Weight Gain") or (MH "Weight Loss") or (MH "Body Weight Changes") or (MH "Obesity") or (MH "Body Weight") or (MH "Body Mass Index") or (MH "Energy Density") or (MH "Energy Intake") or (MH "Food Intake+") or (MH "Nutrient Density") or (MH "Eating") or (MH "Eating Behavior") or (MH "Smoking") or (MH "Smoking Cessation") or (MH "Nutrition") or (MH "Adolescent Nutrition") or (MH "Child Nutrition") or (MH "Food") or (MH "Exertion") or (MH "Physical Endurance+") or (MH "Food Preferences") or (MH "Food Habits") or (MH "Smoking Cessation Programs")
S23 TX tobacco W2 cessation

S24 smoking W2 cessation
S25 TX tobacco W2 smoking
S26 TX cigarette W2 smokers
S27 TX cigarette W2 smoking
S28 TX smoking W2 cessation
S29 TX cigarette W2 use*
S30 TX tobacco W2 use*
S31 TX cigarette W2 usage
S32 TX tobacco W2 usage
S33 TX smoking W2 control
S34 TX tobacco W2 control
S35 TX tobacco W2 smokers
S36 TI leisure or AB leisure
S37 TI physical activit* or AB physical activit*
S38 TI exercise or AB exercise
S39 TI sport or AB sport
S40 TI recreation or AB recreation
S41 TI body mass index or AB body mass index
S42 TI food W2 preference* or AB food W2 preference*
S43 TI dietary or AB dietary
S44 TX obesogenic
S45 TX leptogenic
S46 TI (food choice or food choices) or AB (food choices or food choice)
S47 TI overweight or AB overweight
S48 TI physical fitness or AB physical fitness
S49 TI (sedentary or inactive or inactivity or exertion or obesity or diet or nutrition or eating or obese) or AB (sedentary or inactive or inactivity or exertion or obesity or diet or nutrition or eating or obese)
S50 TI weight W2 loss or AB weight W2 loss
S51 TI weight W2 gain or AB weight W2 gain
S52 S22 or S23 or S25 or S26 or S27 or S28 or S29 or S30 or S31 or S32 or S33 or S34 or S35 or S36 or S37 or S38 or S39 or S40 or S41 or S42 or S43 or S44 or S45 or S46 or S47 or S48 or S49 or S50 or S51
S53 S21 and S52
S54 TI (gift or gifts) or AB (gifts or gift)
S55 TX inducement*
S56 (MH "Motivation") or (MH "Reward") or (MH "Gift Giving")
S57 TI cash W2 transfer or AB cash W2 transfer
S58 TI cash W2 transfer? or AB cash W2 transfer?
S59 TI cash prize* or AB cash prize*
S60 TX incentiv*
S62 TX competitions
S61 TX reward or rewards
S63 TX lottery or lotteries
S64 TX raffle or raffles
S65 TX voucher or vouchers
S68 TX token economi*
S71 S54 or S55 S56 or S57 or S58 or S59 or S60 or S61 or S62 or S63 or S64 or S65 or S68
S72 S53 and S71
S73 S53 and S71

Cochrane Library

Date: 30 June 2009
No of hits: 865
CENTRAL=665; Cochrane Reviews = 115 and Other reviews = 45

#1	MeSH descriptor Reward, this term only
#2	MeSH descriptor Token Economy, this term only
#3	MeSH descriptor Motivation, this term only
#4	MeSH descriptor Gift Giving, this term only
#5	cash NEAR/2 transfer.kw OR cash NEAR/2 transfer* OR cash NEAR/2 prize* OR competitions OR incentiv* OR reward* OR lotter* OR raffle* OR voucher* OR token NEXT econom* OR gift OR gifts OR inducement*
#6	(#1 OR #2 OR #3 OR #4 OR #5)
#7	<nothing>, from 1999 to 2009
#8	(#7 AND #6)
#9	MeSH descriptor Smoking, this term only
#10	MeSH descriptor Tobacco Use Cessation, this term only
#11	MeSH descriptor Smoking Cessation, this term only
#12	smoking NEAR/3 cessation
#13	tobacco NEAR/3 cessation
#14	cigarette NEAR/3 cessation
#15	cigarette smoking
#16	cigarette NEAR/2 smoking OR tobacco NEAR/2 smoking OR cigarette NEAR/2 use OR cigarette NEAR/2 usage OR tobacco NEAR/2 usage OR tobacco NEAR/2 use OR tobacco NEAR/2 control OR smoking NEAR/2 control OR tobacco NEAR/2 smokers OR cigarette NEAR/2 smokers
#17	(#9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16)
#18	(#8 AND #17)
#19	dietary OR obesogenic OR leptogenic OR "physical fitness" OR food NEAR/2 choice* OR overweight OR sedentary OR inactive OR inactivity OR exertion OR obesity OR diet OR nutrition OR weight NEAR/2 loss OR eating OR obese OR weight NEAR/2 gain OR food NEAR/2 preference*
#20	physical NEAR/2 activit* OR exercise OR sport OR recreation OR leisure OR "body mass index"
#21	MeSH descriptor Exercise, this term only
#22	MeSH descriptor Recreation, this term only
#23	MeSH descriptor Leisure Activities, this term only

#24 MeSH descriptor Body Mass Index, this term only

#25 MeSH descriptor Body Weight, this term only

#26 MeSH descriptor Body Weight Changes explode all trees

#27 MeSH descriptor Overweight explode all trees

#28 MeSH descriptor Overnutrition explode all trees

#29 MeSH descriptor Body Size, this term only

#30 MeSH descriptor Physical Fitness, this term only

#31 (#19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30)

#32 (#8 AND #31)

#33 (#18 OR #32)

ERIC

Interface: CSA
Date: 29 June 2009
Hits: 466
Publication Date 1999-2009

DE=("awards" or "incentive grants" or "incentives" or "motivation" or "rewards" or "token economy") or TI=("cash transfer" OR "cash transfers" OR "cash prizes" OR "competitions" OR incentiv* OR "reward" OR "rewards" OR "lottery" OR "lotteries" OR "raffle" OR "raffles" OR "voucher" OR "vouchers" OR "token economy" OR "token economies" OR "token economics" OR "gift" OR "gifts" OR "inducement" OR "inducements") or (AB=("cash transfer" OR "cash transfers" OR "cash prizes" OR "competitions" OR incentiv* OR "reward" OR "rewards" OR "lottery" OR "lotteries" OR "raffle" OR "raffles" OR "voucher" OR "vouchers" OR "token economy" OR "token economies" OR "token economics" OR "gift" OR "gifts" OR "inducement" OR "inducements")

AND

DE=("physical activities" or "recreational activities" or "health activities" or "addictive behavior" or "body weight" or "eating habits" or "leisure time" or "obesity" or "playground activities" or "recreation" or "smoking" or "physical activity level" or "eating habits" or "exercise" or "health related fitness" or "physical fitness") or TI=("dietary" OR "obesogenic" OR "leptogenic" OR "physical fitness" OR "food choice" OR "food choices" OR "overweight" OR "sedentary" OR "inactive" OR "inactivity" OR "exertion" OR "obesity" OR "diet" OR "nutrition" OR "weight loss" OR "eating" OR "obese" OR "weight gain" OR "food preference" OR "food preferences" OR "physical activity" OR "exercise" OR "sport" OR "recreation" OR "physical activities" OR "leisure" OR "body mass index" or "tobacco use cessation" OR "cigarette smoking" OR "tobacco smoking" OR "cigarette use" OR "cigarette usage" OR "tobacco usage" OR "tobacco use" OR "smoking cessation" OR "tobacco control" OR "smoking control" OR "tobacco smokers" OR "cigarette smokers") ORAB=("dietary" OR "obesogenic" OR "leptogenic" OR "physical fitness" OR "food choice" OR "food choices" OR "overweight" OR "sedentary" OR "inactive" OR "inactivity" OR "exertion" OR "obesity" OR "diet" OR "nutrition" OR "weight loss" OR "eating" OR "obese" OR "weight gain" OR "food

preference" OR "food preferences" OR "physical activity" OR "exercise" OR "sport" OR "recreation" OR "physical activities" OR "leisure" OR "body mass index" or "tobacco use cessation" OR "cigarette smoking" OR "tobacco smoking" OR "cigarette use" OR "cigarette usage" OR "tobacco usage" OR "tobacco use" OR "smoking cessation" OR "tobacco control" OR "smoking control" OR "tobacco smokers" OR "cigarette smokers")

Google Scholar

Date range 1999-2009
Date: 30 June 2009
Hits: 95
All subject areas

English pages for allintitle: incentives activity OR exercise OR fitness OR diet OR obesity OR smoking OR cigarette OR smokers OR obese OR overweight OR sedentary OR dietary OR weight OR eating OR inactive OR inactivity OR tobacco OR obesogenic OR leptogenic

International Bibliography of the Social Sciences (IBSS)

Interface: EBSCO host
Date: 30 June 2009
Hits: 468
Publication Date 1999-2009

TX "cash transfer" OR "cash transfers" OR "cash prizes" OR "competitions" OR incentiv* OR "reward" OR "rewards" OR "lottery" OR "lotteries" OR "raffle" OR "raffles" OR "voucher" OR "vouchers" OR "token economy" OR "token economies" OR "token economics" OR "gift" OR "gifts" OR "inducement" OR "inducements" OR (DE "Gift" or DE "Financial incentives" or DE "Material incentives") or (DE "Motivation")

AND

TX "dietary" OR "obesogenic" OR "leptogenic" OR "physical fitness" OR "food choice" OR "food choices" OR "overweight" OR "sedentary" OR "inactive" OR "inactivity" OR "exertion" OR "obesity" OR "diet" OR "nutrition" OR "weight loss" OR "eating" OR "obese" OR "weight gain" OR "food preference" OR "food preferences" OR "physical activity" OR "exercise" OR "sport" OR "recreation" OR "physical activities" OR "leisure" OR "body mass index" OR DE "Physical activity" OR DE "Sport" OR DE "Leisure" OR DE "Recreation" OR DE "Sports" OR DE "Travel" OR DE "Tourism" or DE "Leisure" or DE "Recreation" or DE "Smoking" or DE "Tobacco" or DE "Nutrition" or DE "Diet" or DE "Dietary change" OR TX ("cigarette smoking" OR "tobacco smoking" OR "cigarette use" OR "cigarette usage" OR "tobacco usage" OR "tobacco use" OR "smoking cessation" OR "tobacco control" OR "smoking control" OR "tobacco smokers" OR "cigarette smokers") or TX "smoking cessation"

Psychinfo

Interface: EBSCO host
Date: 25 June 2009
Hits: 535

Limiters - Publication Year from: 1999-2009
Search modes - Boolean/Phrase
Population Group: Human

S1 control* N8 stud* or random* or RCT or DE "Clinical Trials" or trial* or prospect* W5 stud* or placebo or DE "treatment effectiveness evaluation"
S2 TX "evaluation studies"
S3 TX "Review" OR "meta-analysis" OR "systematic overview" OR "systematic synthesis" OR "meta-ethnography" OR "systematic narrative" OR "systematic review" OR "evidence review" OR "review of literature" OR controlled
S4 DE "Literature Review" or DE "Meta Analysis" or DE "Program Evaluation" or DE "Educational Program Evaluation" or DE "Mental Health Program Evaluation"
S5 S1 or S2 or S3 or S4
S6 DE "Sports" or DE "Sports (Attitudes Toward)" or DE "Exercise" or DE "Physical Activity" or DE "Aerobic Exercise" or DE "Physical Fitness" OR DE "Activity Level" OR DE "Recreation" OR DE "Leisure Time" OR DE "Recreation Areas"
S7 DE "Body Mass Index" or DE "Body Size" or DE "Body Weight" or DE "Obesity" or DE "Overweight" or DE "Weight Control"
S8 DE "Diets" OR DE "Eating Attitudes" or DE "Eating Behavior" or DE "Nutrition" or DE "Energy Expenditure" or DE "Calories" or DE "Food Intake" or DE "Food Preferences"
S9 DE "Weight Gain" OR DE "Weight Loss"
S10 DE "Sports" or DE "Sports (Attitudes Toward)" or DE "Exercise" or DE "Physical Activity" or DE "Aerobic Exercise" or DE "Physical Fitness" OR DE "Activity Level" OR DE "Recreation" OR DE "Leisure Time"
S11 TX dietary OR obesogenic OR leptogenic OR physical fitness OR food choice OR food choices OR overweight OR sedentary OR inactive OR inactivity OR exertion OR obesity OR diet OR nutrition OR weight loss OR eating OR obese OR weight gain OR food preference OR food preferences
S12 TX physical activity OR exercise OR sport OR recreation OR physical activities OR leisure OR body mass index
S13 TX "tobacco use cessation" OR "cigarette smoking" OR "tobacco smoking" OR "cigarette use" OR "cigarette usage" OR "tobacco usage" OR "tobacco use" OR "smoking cessation" OR "tobacco control" OR "smoking control" OR "tobacco smokers" OR "cigarette smokers"
S14 DE "Tobacco Smoking" or DE "Smoking Cessation"
S15 S6 or S7 or S8 or S9 or S10 or S11 or S12 or S13 or S14
S16 S5 and S15
S17 cash transfer OR cash transfers OR cash prizes OR competitions OR incentiv* OR "reward" OR "rewards" OR "lottery" OR "lotteries" OR "raffle" OR "raffles" OR "voucher" OR "vouchers" OR "token economy" OR "token economies" OR "token economics" OR "gift" OR "gifts" OR "inducement" OR "inducements"
S18 TI incentiv*
S19 ((DE "Incentives" or DE "Educational Incentives" or DE "Monetary Incentives") or (DE "Rewards" or DE "External Rewards" or DE "Internal Rewards" or DE "Monetary Rewards" or DE "Preferred Rewards")) or (DE "Motivation")
S20 DE "Token Economy Programs"
S21 DE "Token Economy Programs" or DE "reinforcement"
S22 S17 or S19 or S21
S23 S16 and S22
S24 S16 and S22
S25 S17 or S19 or S20
S26 S16 and S25
S27 ((DE "Incentives" or DE "Educational Incentives" or DE "Monetary Incentives") or (DE "Rewards" or DE "External Rewards" or DE "Monetary Rewards" or DE "Preferred Rewards")) or (DE "Motivation")
S28 S17 or S27 or S21
S29 S16 and S28

S30 ((DE "Incentives" or DE "Educational Incentives" or DE "Monetary Incentives") or (DE "Rewards" or DE "External Rewards" or DE "Monetary Rewards" or DE "Preferred Rewards"))
S31 S17 or S30 or S21
S32 S16 and S31

Pubmed

Date: 25 June 2009
Hits: 1608

((dietary[tiab] OR obesogenic[tw] OR leptogenic[tw] OR physical fitness[tw] OR food choice[tw] OR food choices[tw] OR overweight[tw] OR sedentary[tw] OR inactive[tiab] OR inactivity[tiab] OR exertion[tiab] OR obesity[tw] OR diet[tiab] OR nutrition[tw] OR weight loss[tw] OR eating[tiab] OR obese[tw] OR weight gain[tw] OR food preference[tw] OR food preferences[tw] OR physical activity[tw] OR exercise[tw] OR sport[tw] OR recreation[tw] OR physical activities[tw] OR leisure[tw] OR body mass index[tw] OR body weight[mh] OR overnutrition[mh] OR body size[mh]) OR (smoking[mh] OR tobacco use cessation[tw] OR "cigarette smoking"[tiab] OR "tobacco smoking"[tiab] OR "cigarette use"[tiab] OR "cigarette usage"[tiab] OR "tobacco usage"[tiab] OR "tobacco use"[tiab] OR "smoking cessation"[tw] OR "tobacco control"[tiab] OR "smoking control"[tiab] OR "tobacco smokers"[tiab] OR "cigarette smokers"[tiab]))

AND

(Reward[mh] OR Motivation[mh:noexp] OR token economy[mh] OR gift giving[mh] OR cash transfer[tiab] OR cash transfers[tiab] OR cash prizes[tiab] OR competitions[tiab] OR incentiv*[tiab] OR "reward"[tiab] OR "rewards"[tiab] OR "lottery"[tiab] OR "lotteries"[tiab] OR "raffle"[tiab] OR "raffles"[tiab] OR "voucher"[tiab] OR "vouchers"[tiab] OR "token economy"[tiab] OR "token economies"[tiab] OR "token economics"[tiab] OR "gift"[tiab] OR "gifts"[tiab] OR "inducement"[tiab] OR "inducements"[tiab])

AND

((evaluation studies[pt] OR program evaluation[mh] OR "Review "[pt] OR "meta-analysis"[tw] OR "systematic overview"[tw] OR "systematic synthesis"[tw] OR "meta-ethnography"[tw] OR "systematic narrative"[tw] OR "systematic review"[tw] OR "evidence review"[tw] OR "review of literature"[tw] OR randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR randomly[tiab] OR trial[tiab] OR controlled[tiab]) OR ("Review Literature as Topic"[mh]) OR ("Meta-Analysis as Topic"[mh]))

AND

("1999"[Publication Date] : "2009"[Publication Date])

Scirus

Date range 1999-2009
Date: 30 June 2009
Hits: 208 hits but could only download the first 100 ordered by relevance.

Any of the words In the title: incentives incentive voucher vouchers prize*

AND

Any of the words In the title: "physical activity" exercise fitness diet obesity smoking cigarette smokers obese overweight sedentary dietary eating tobacco obesogenic leptogenic

Social Science Citation Index

Interface: Web of Knowledge
Date: 30 June 2009
Hits: 504
Timespan=1999-2009
Language=(English)

1. TS=(RCT or RCTs or trial or trials)
2. TS=(randomized SAME study or randomized SAME studies)
3. TS=(randomised SAME study or randomised SAME studies)
4. TS=(control SAME study or control SAME studies)
5. TS=(controlled SAME study or controlled SAME studies)
6. TS=("literature review" OR "systematic review" OR "synthesis of results" OR "meta-analysis" OR "systematic overview" OR "meta-ethnography" OR "systematic narrative" OR "review of literature" OR search*)
7. TS=("evidence syntheses" OR "evidence synthesis" OR "evidence review" OR "evaluation stud*")
8. TS=("cash transfer" OR "cash transfers" OR "cash prizes" OR "competitions" OR incentiv* OR "reward" OR "rewards" OR "lottery" OR "lotteries" OR "raffle" OR "raffles" OR "voucher" OR "vouchers" OR "token economy" OR "token economies" OR "token economics" OR "gift" OR "gifts" OR "inducement" OR "inducements")
9. TS=("dietary" OR "obesogenic" OR "leptogenic" OR "physical fitness" OR "food choice" OR "food choices" OR "overweight" OR "sedentary" OR "inactive" OR "inactivity" OR "exertion" OR "obesity" OR "diet" OR "nutrition" OR "weight loss" OR "eating" OR "obese" OR "weight gain" OR "food preference" OR "food preferences" OR "physical activity" OR "exercise" OR "sport" OR "recreation" OR "physical activities" OR "leisure" OR "body mass index") AND Language=(English)
10. TS=(cigarette SAME cessation) AND Language=(English)
#11. TS=(tobacco SAME cessation) AND Language=(English)
12. TS=("cigarette smoking" OR "tobacco smoking" OR "cigarette use" OR "cigarette usage" OR "tobacco usage" OR "tobacco use" OR "tobacco control" OR "smoking control" OR "tobacco smokers" OR "cigarette smokers")
13. TS=(smoking SAME cessation) AND Language=(English)
14 #13 OR #12 OR #11 OR #10 OR #9
15.. #14 AND #8
16. #7 OR #6 OR #5 OR #4 OR #3 OR #2 OR #1
17. #14 AND #16

Social Policy and Practice

Interface: OVID SP
Date: 13 August 2009
Hits: 191
Timespan=1999-2009

1 (diet$ or obesogenic or leptogenic or fitness or food choice? or overweight or sedentary or inactive or inactivity or exertion or obesity or diet$ or nutrition or weight loss or eating or obese or weight gain or food preference? or physical activity or exercise or sport or recreation or physical activities or leisure or body mass index or body weight or overnutrition or body size or smoking or tobacco or cigarette? or smoker?).mp. [mp=abstract, title, publication type, heading word, accession number] (17499)
2 (reward? or cash transfer? or cash-transfer? or cash prize? or competitions or incentiv$ or disincentiv$ or lottery or lotteries or raffle? or voucher? or token econom$ or gift? or inducement?).mp. [mp=abstract, title, publication type, heading word, accession number] (3405)
3 1 and 2 (273)
4 limit 3 to yr="1999 -Current" (191)

TROPHI (Trials Register of Promoting Health Interventions) and DoPHER (Database of Promoting Health Effectiveness Reviews)

Date: 25 June 2009
Hits: 354 (TRoPHI: 264 DoPHER: 90)

1 Keyword: Type(s) of intervention: incentives
2 Freetext (item record) "incentive*"
3 Freetext (item record) FORMSOF (INFLECTIONAL , "incentive")
4 Freetext (item record) reward
5 Freetext (item record) "reward*"
6 Freetext (item record) "inducement*"
7 Freetext (item record) "voucher*"
8 Freetext (item record) "token*"
9 Freetext (item record) "cash"
10 Freetext (item record) FORMSOF (INFLECTIONAL , "financial")
11 Freetext (item record) "gift*"
12 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11

Appendix 2: Reports of included studies

Alessi SM, Badger GJ, Higgins ST (2004) An experimental examination of the initial weeks of abstinence in cigarette smokers. *Experimental and Clinical Psychopharmacology* 12: 276-287.

Alessi SM, Petry NM, Urso J (2008) Contingency management promotes smoking reductions in residential substance abuse patients. *Journal of Applied Behavior Analysis* 41: 617-622.

An LC, Bluhm JH, Foldes JH, Alesci SS, Klatt NL, Center CM, Nersesian BA, Larson WS, Ahluwalia ME, Manley JS, An MWAF, Bluhm LC, Foldes JH, Alesci SS, Klatt NL, Center CM, Nersesian BA (2008) A randomized trial of a pay-for-performance program targeting clinician referral to a state tobacco quitline. *Archives Of Internal Medicine* 168: 1993-1999.

An LC, Klatt C, Perry CL, Lein EB, Hennrikus DJ, Pallonen UE, Bliss RL, Lando HA, Farley DM, Ahluwalia JS, Ehlinger EP (2008) The RealU online cessation intervention for college smokers: A randomized controlled trial. *Preventive Medicine 47: 194-199*.

Anderson JV, Bybee DI, Brown RM, McLean DF, Garcia EM, Breer ML, Schillo BA (2001) 5 a day fruit and vegetable intervention improves consumption in a low income population. *Journal of the American Dietetic Association* 101: 195-202.

Andrews JO, Bentley G, Crawford S, Pretlow L, Tingen MS (2007) Using community-based participatory research to develop a culturally sensitive smoking cessation intervention with public housing neighborhoods. *Ethnicity & Disease* 17: 331-337.

Bains N, Pickett W, Laundry B, Mercredy D (2000) Predictors of smoking cessation in an incentive-based community intervention. *Chronic Diseases in Canada* 21: 54-61.

Balding A (2001) Pupils get 'Fit to Succeed': a pilot project in the West Country found that not only could regular exercise be promoted - but also found links with academic performance. *Education and Health* 19: 17-20.

Bauer JE, Carlin-Menter SM, Celestino PB, Hyland A, Cummings KM (2006) Giving away free nicotine medications and a cigarette substitute (Better Quit) to promote calls to a quitline. *Journal of Public Health Management and Practice*12: 60-67.

Bauld L, Mc Neil A, Hackshaw L, Murray R (2007) *The effectiveness of smoking cessation interventions to reduce the rates of premature death in disadvantaged areas through proactive case finding, retention and access to services.* University of Bath, University of Nottingham.

Bell K, Richardson L, McCullough L, Greaves L (2006) *Evidence Review. Workplace interventions to promote smoking cessation.* British Columbia Center of Excellence for Women's Health http://www.nice.org.uk/guidance/index.jsp?action=download&o=31951

Bloch MJ, Armstrong DS, Dettling L, Hardy A, Caterino K, Barrie S (2006) Partners in lowering cholesterol: comparison of a multidisciplinary educational program, monetary incentives, or usual care in the treatment of dyslipidemia identified among employees. *Journal of*

*occupational and environmental medicine*48: 675-681.

Brown DS, Finkelstein EA (2007) Testing the Use of Financial Incentives to Increase Physical Activity Among Sedentary Adults: Results of a Stated Preference Survey and Revealed Preference Field Experiment*iHEA 2007 6th World Congress: Explorations in Health Economics Paper,* SSRN Working Paper Series.

Burr ML, Trembeth J, Jones KB, Geen J, Lynch LA, Roberts ZE (2007) The effects of dietary advice and vouchers on the intake of fruit and fruit juice by pregnant women in a deprived area: a controlled trial. *Public Health Nutrition* 10: 559-565.

Butsch WS, Ard JD, Allison DB, Patki A, Henson CS, Rueger MM, Hubbert KA, Glandon GL, Heimburger DC (2007) Effects of a reimbursement incentive on enrollment in a weight control program. *Obesity (Silver Spring, Md)* 15: 2733-2738.

Cahill K, Moher M, Lancaster T (2008) Workplace interventions for smoking cessation. In: *The Cochrane Database of Systematic Reviews 2004: Issue 4.*

Cahill K, Perera R (2008a). Quit and Win contests for smoking cessation. In: *The Cochrane Database of Systematic Reviews*, 2008: Issue 4. DOI: 10.1002/14651858.CD004986.pub3

Cahill K, Perera R (2008b) Competitions and incentives for smoking cessation. In: *The Cochrane Database of Systematic Reviews*, 2008: Issue 3. DOI: 10.1002/14651858.CD004307.pub3

Chang FC, Hu TW, Lin M, Yu PT, Chao KY (2008) Effects of financing smoking cessation outpatient services in Taiwan. *Tobacco Control* 17: 183-189.

Charness G, Gneezy U (2009) Incentives to Exercise. *Econometrica* 77: 909-931.

Chaudhary N; Kreiger N (2007) Nutrition and physical activity interventions for low-income populations. *Canadian Journal of Dietetic Practice and Research* 68:201-206.
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Appendix 3: Summary of the systematic reviews identified

Systematic reviews with the specific aim to evaluate incentives (N=12)

Smoking behaviours (N=6)	Type of incentive	Populations	Level	Outcome
Cahill and Perera (2008b) Competitions and incentives for smoking cessation	Competitions and incentives for smoking cessation	Adult smokers	Unclear	Smoking behaviours
Cahill and Perera (2008a) Quit and Win contests for smoking cessation	Quit and Win contests	Adult smokers	Unclear	Smoking behaviours
Higgins et al. (2002) Voucher-based incentives. A substance abuse treatment innovation.	Vouchers	Substance abusers, including pregnant and recently postpartum women, adolescents, and those with serious mental illness	Unclear	Smoking behaviours
Kavanagh et al. (2006) A systematic review of the evidence for incentive schemes to encourage positive health and other social behaviours in young people	A range of material incentives, and Quit and Win contests with young people	Young people, 11-19 years	Unclear	Smoking and a range of health and other social behaviours
O'Connor et al. (2006) Financial incentives to promote smoking cessation: Evidence from 11 quit and win contests in New York	Quit and Win contests	Adult smokers	Unclear	Smoking behaviours
Reda et al. (2009) Healthcare financing systems for increasing the use of tobacco dependence treatment	Financial	General population	Organisational	Smoking behaviours

Weight loss/obesity (N=3)				
Paul-Ebhohimhen and Avenell (2008) Systematic review of the use of financial incentives in treatments for obesity and overweight.	Financial	General (mainly females)	Unclear	Weight loss or maintenance
Wall et al. (2006) Effectiveness of monetary incentives in modifying dietary behavior: a review of randomized, controlled trials	Financial	General population	Unclear	Food purchases, food intake, weight loss.
Goodman and Anise (2006) What is known about the effectiveness of economic instruments to reduce consumption of foods high in saturated fats and other energy-dense foods for preventing and treating obesity?	Financial	General population	Organisational/ National/ Regional	Food intake, particularly foods high in saturated fats and other energy-dense foods.
Health behaviours (N=4)				
Kavanagh et al. (2006) A systematic review of the evidence for incentive schemes to encourage positive health and other social behaviours in young people	A range of material incentives	Young people, 11-19 years	Unclear	Smoking and a range of health and other social behaviours
Kane et al. (2004) A structured review of the effect of economic incentives on consumers' preventive behaviour	Financial	General population	Unclear	Health behaviours
Lagarde et al. (2007) Conditional cash transfers for improving uptake of health interventions in low- and middle-income countries: a systematic review	Financial	General population, low socio-economic group	Unclear	Access to health services and other health outcomes

Sutherland et al. (2008) Impact of Targeted Financial Incentives On Personal Health Behavior A Review of the Literature	Financial	General population	Unclear	Health behaviours

Systematic reviews where the effectiveness of incentives is not the main aim (N=15)

Smoking behaviours (N=5)	Type of incentive	Populations	Level	Outcome
Smedslund (2004) The effectiveness of workplace smoking cessation programmes: a meta-analysis of recent studies	Unclear	Workplace	Unclear	Smoking behaviours
Bauld et al. (2007) The effectiveness of smoking cessation interventions to reduce the rates of premature death in disadvantaged areas through proactive case finding, retention and access to services	Unclear	General population in low socio-economic areas	Unclear	Smoking behaviours
Bell et al. (2006) Evidence Review. Workplace interventions to promote smoking cessation	Unclear	Workplace	Unclear	Smoking behaviours
Jepson et al. (2006) A review of the effectiveness of mass media interventions which both encourage quit attempts and reinforce current and recent attempts to quit smoking	Unclear	General population, emphasis on young people, pregnant smokers and hard to reach communities.	Organisation, national level.	Smoking behaviours
Cahill et al. (2008) Workplace interventions for smoking cessation.	Unclear	Workplace	Unclear	Smoking behaviours

Weight loss/ diet/physical activity/obesity (N=8)				
Paul-Ebhohimhen et al. (2009) A Systematic Review of the Effectiveness of Group versus Individual Treatments for Adult Obesity	Unclear	Adults, mainly female	Individual	Weight or BMI
Stuart et al. (2005) An integrative review of interventions for adolescent weight loss	Unclear	Young people, 11-19 years	Unclear	Weight or BMI
Mother and Infant Research Unit (MIRU), University of York (2007) The effectiveness of public health nutrition interventions provided to pregnant women that aim to improve pregnancy outcomes	Unclear	Pregnant women	Unclear	improving their dietary intake and nutritional status
Sahyoun et al. (2004) Evaluation of nutrition education interventions for older adults: a proposed framework.	Unclear	Older adults	Unclear	Healthy eating levels
Vidourek and King (2008) Effectiveness of nutrition programs in increasing healthy eating behaviors among low income women	Unclear	low-income females	Unclear	Healthy eating levels
NICE Public Health Collaborating Centre – Physical Activity (2008) Physical activity and children Review 5: Intervention Review: Children and active travel	Unclear	children and young people under 18 years old	Unclear	Physical activity levels

Matson-Koffman et al. (2005) A site-specific literature review of policy and environmental interventions that promote physical activity and nutrition for cardiovascular health: what works?	Unclear	General population	Organisational, regional, national	Health eating, physical activity, access to sports facilities
Chaudhary and Kreiger (2007) Nutrition and physical activity interventions for low-income populations	Unclear	General population, low-income	Unclear	Healthy eating and physical activity
Health behaviours (N=2)				
Janer et al (2002) Health promotion trials at worksites and risk factors for cancer	Unclear	Workplace	Unclear	Smoking behaviours , physical activity, healthy eating, weight or BMI
Matson Koffman et al. (2005a) Heart healthy and stroke free: successful business strategies to prevent cardiovascular disease.	Unclear	Workplace	Organisation	Cardiovascular health, cost savings to employer from health and productivity-related costs

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