

# Financial incentives for health behaviour change: a rapid review

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J Hall

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**This report was prepared by:**

Jane Hall  
Centre for Health Economics Research and Evaluation (CHERE)  
University of Technology, Sydney

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**Enquiries regarding this report may be directed to:**

Knowledge Exchange Program  
Sax Institute  
Level 2, 10 Quay Street Haymarket NSW 2000  
PO Box K617 Haymarket NSW 1240 Australia  
T: +61 2 95145950  
F: +61 2 95145951  
Email: [knowledge.exchange@saxinstitute.org.au](mailto:knowledge.exchange@saxinstitute.org.au)

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# 1 EXECUTIVE SUMMARY

## *What kinds of financial incentives could be used to modify physical activity and eating behaviours?*

Financial incentives can be positive (rewards) or negative (penalties); they can be in cash (bonuses or discounts) or in kind (goods and services, usually limited to health related or more healthy alternatives). Many schemes involve vouchers or points earned which can be exchanged for gifts. They can involve lowering the price or providing something for free, such as foods judged to healthier alternatives or access to exercise facilities.

## *What is the evidence about the impact of these incentives in (a) modifying health behaviours, and (b) improving health?*

There is little rigorous evaluation. Many programs rely on voluntary enrolment so the results of evaluations are susceptible to bias. There are no programs which report long term follow-up results on diet or exercise or on final health outcomes.

Financial incentives can be effective in promoting behaviour change under certain conditions; most importantly where the desired behaviour change is simple and requires a one-time change, such as a single visit for immunisation. The evidence is that they are unlikely to be effective in changing complex and ongoing behaviours such as diet and physical activity. Even where short term impact on diet or exercise has been demonstrated, the effects have not been sustained in the long term. In addition, they may have unintended effects; in particular for the group of people whose intrinsic motivation for healthy behaviour is high, the desired behaviour can be reduced once the extrinsic reward is discontinued.

## *Are there any well established schemes internationally or in Australia that utilise financial incentives to modify health behaviours?*

There is growing interest in the use of financial incentives to modify behaviours, but as yet few established broad programs. There are well established programs which deliver free or subsidised fruit and vegetables to primary school children (Norway), and offer rewards for increased consumption (UK but possibly used in other countries also). In Germany participation in exercise programs is rewarded through reduced health insurance premiums, but this occurs in a social insurance system not a market of competing private insurers. There are several programs implemented in US States but these to date have focused on treatment compliance, screening and immunisation, and have often been targeted to low income families.

## *For each evaluated incentive, is there evidence about the differential impact on different income or cultural groups?*

Many programs targeting diet and exercise have been aimed at middle income groups, while those aimed at changing simple behaviours and improving health service visits for antenatal care, early childhood checks and immunisations have been targeted to low income groups. There is almost no evidence about differential impact across income or cultural groups.

However, there are substantial grounds for concern about differential impacts. Where financial incentives are linked to access to treatment or require enrolment into a program, adverse distributional impacts are likely; lower income and disadvantaged cultural groups are less likely to enrol; and where additional services depend on some compliance, they may actually be denied appropriate support or services. On the other hand low income groups are likely to be more responsive to price changes when high prices are a barrier to desired behaviour. For example, high prices of fruit and vegetables or high entry prices to sport and exercise facilities are likely to be a stronger deterrent for those with limited financial resources.

## *Conclusion*

The evidence does not support widespread use of financial incentives in personal behaviour change. While there may be a limited role for considering financial incentives when they reduce or remove barriers to a desired behaviour, or where they reinforce habit formation, such programs require careful planning and development, and a commitment to evaluation.

## 2 Scope of this review

This paper reviews the use of financial incentives in promoting changes in behaviour related to overweight and obesity. It examines incentives targeted at dietary and exercise changes, aimed at the individual (including family) but not health providers, nor food suppliers. The details of the search strategy are given in the appendix.

There are a number of recent reviews of the effectiveness of financial incentives, reflecting the growing interest in this topic. The scope of these reviews has largely been limited to some form of clinical trial. There is other evidence that is useful in considering the role and effectiveness of financial incentives, which comes from a broader consideration of the evidence, including investigating consumers' response to changes in price, and modelling the effects of taxation.

There are also a range of programs which have implemented financial incentives. Many programs are provided by individual employers, particularly in the US; see for example, National Business Group on Health (2007). US State governments are implementing a range of programs but most of these target use of health services such as immunisation, screening and well child check-ups (Greene, 2007; Redmond et al., 2007). New programs are being developed and implemented in the UK, e.g. the Pounds for Pounds trial in Kent (see [www.nhsweightlosstrial.com](http://www.nhsweightlosstrial.com)).

### 3 Defining financial incentives

Financial incentives are most readily thought of as payments to encourage desired change. However, the financial incentives that can be considered are much broader than direct payments. The table provides a means of categorising financial incentives and provides examples of programs where the literature provides these.

Financial incentives can be positive thus reinforcing desired change, or negative imposing penalties if change is not achieved. Incentives may remove barriers to access by reducing the costs of behaviour change or provide rewards. Rewards may be cash bonuses or vouchers that provide gifts. The incentive itself may be directed at participation (such as enrolling in exercise classes, attending dietary counselling sessions), at behaviour change (maintaining an exercise regime, adhering to a healthier diet) or outcome (weight loss).

One group of financial incentives are price changes; these are intended to make healthy choices cheaper choices. Drewnowski and others have pointed out that a diet high in fruits and vegetables is a more expensive option than one consisting of more energy dense foods (Drewnowski and Darmon, 2005; Drewnowski and Specter, 2004). Other commentators have considered that participation in exercise programs through regular gym attendance imposes a financial barrier which can be lessened by providing free gym membership or subsidised fees. In other cases time costs have been considered; for example, if employers provide on-site facilities or paid time from work, the real cost of exercise is reduced. Adopting this type of incentive does not change the intrinsic motivation of individuals but by changing prices makes them more likely to choose the healthier alternative; they are still acting in their own interest but the change in relative prices makes this behaviour 'utility maximising' in economic terms. Of course price subsidies cannot make a difference if facilities are lacking, for example if exercise centres are not provided or local shops do not sell fresh fruit and vegetables.

The opposite approach is to make unhealthy choices more expensive through the imposition of higher charges or taxes. There is substantial experience in using taxation to alter consumption in tobacco and alcohol. The arguments about higher taxes on unhealthy food are more complex than those concerned with tobacco. Whereas any tobacco use is harmful, dietary change is largely concerned with a balanced diet rather than removing such foodstuffs entirely. Further, as food is essential and a higher component of household expenditure in low income groups, taxes on food have equity considerations.

Rewards in contrast to price changes are an attempt to change motivation. Extrinsic rewards can be delivered as cash bonuses. Alternatively they can be implemented as points systems where the accumulated points can be exchanged for goods or services, similar to a frequent fliers or a loyalty card program. The rewards may be limited to healthy products, to directly health related products such as pharmacy supplies, or to at least health neutral products.

Several writers have pointed to the unintended potential effect of replacing intrinsic motivation with extrinsic rewards. While extrinsic motivation may be powerful in prompting behaviour change, the new behaviour is unlikely to be maintained once the external reward is ceased. Further it has been suggested that extrinsic motivation may reduce intrinsic motivation; the desired behaviour is seen as less worthwhile so that those who were already motivated actually reduce that behaviour. An alternative view of behaviour change is that complex behaviours are the result of habit; one's preference for current behaviour is influenced by one's previous behaviour. Under this approach the role of incentives is to reinforce the reward of changing behaviour, and that once the new habit is formed individuals will be self-motivated. (Cameron et al., 2001; Charness and Gneezy, 2008; Frey and Jegen, 2001; Frey and Oberholzer-Gee, 1997).



## 4 Categories of financial incentives (with examples)

Type		Target for reward			
			Participation	Behaviour	Outcome
Positive	Prices (subsidies)		<p>Reduce cost of healthy snacks available in canteens or vending machines e.g. university vending machines (French et al., 1997)</p> <p>Reduce insurance premiums for gym enrolment e.g. Pruhealth in UK (Wilkinson, 2008)</p> <p>Provide coupons for food purchased at farmers' markets e.g. (Anderson et al., 2001)</p>	Reduce insurance premium for sticking to exercise regimen	Lower premiums for maintaining desired Body Mass Index (BMI)
	Direct payment		Cash bonus for attending supervised exercise session e.g. (Jeffrey et al., 1998)	Cash bonus for sticking to prescribed diet	Cash bonus for weight loss
	Rewards in kind		Points for selecting fruit or vegetable serves at school lunches which can be accumulated for i-pods, cinema tickets. e.g. Food Dudes program (Horne et al., 2004)	Points or vouchers for sticking to exercise program	Points or vouchers for weight loss achieved
Negative	Prices (taxes)		Impose fat taxes		Higher insurance premium for overweight or obese
	Contracting	Financial	Financial loss for selecting unhealthy option	<p>Financial loss if drop out from exercise program</p> <p>e.g. Deposit returned for attending group meetings (Wing et al., 1981)</p>	<p>Loss of deposit if agreed weight loss not achieved</p> <p>E.g. deposit returned weekly instalments as weight lost (Wing et al., 1981)</p>
		Reduced access	Loss of access to some services if not keeping appointments for preventive check-ups e.g. (Silow-Carrol and Alteras, 2007)	Loss of access to better health insurance if not maintaining healthy lifestyle	

Another form of reward has been implemented through health insurance (not necessarily private insurance). Individuals who meet targets (which could be outcomes or participation) may be offered discounted premiums on private health insurance or access to a greater range of services. This is in effect a price reduction, but it is argued that linking the reward to health services reinforces the health message of lifestyle change. Such a program is offered through a large private insurer in the UK. Both in Germany through sickness funds, and in the US through the Medicaid programs in some States, individuals may be denied services if they acted irresponsibly, such as failing to attend for follow up appointments or for refusing immunisation.

Contracting is a means of imposing obligations reinforced by a penalty. The individual agrees to some behaviour change and the penalty is imposed if they do not keep to their agreement. This is generally implemented in this way; the individual agrees to a change, such as participation in exercise and lodges an amount of money similar to a bond. If they break the contract they lose some or all of the amount lodged. In theory this approach could also be applied to vouchers. Individuals commence with a set of points which are lost for undesired behaviour, analogous to driving licence points, and at the end of the period points can be redeemed for rewards. In practice there have been several programs which have trialled contracts for weight loss.

Contracting has been also been used in conjunction with health insurance cover. Individuals who meet certain agreed targets could be provided with access to a greater range of services, though the only programs identified were based on participation in change programs not results achieved.

Although rewards and penalties may be similar in terms of their financial impact, they can have quite different psychological impacts and so their effectiveness may vary considerably. This is particularly true in terms of unintended effects. For example, penalties may lead to a sense of failure, lowered self-esteem and may make it more difficult for a person to try again or try an alternative approach. However, unintended effects can also occur with rewards; for example the Productivity Commission has reported on Indigenous children taking up petrol-sniffing so as to qualify for the benefits which could be claimed for giving up (Banks, 2009).

## 5 An incentive for what?

The next aspect to consider is what triggers the incentive? Take as an example the provision of personalised counselling on exercise which is intended to help individuals build regular exercise into their daily lives and so facilitate weight loss. The incentive could be triggered by participation in the intervention; so in this case the individual is rewarded (or penalised) for attending the scheduled counselling sessions. Attendance is readily and inexpensively monitored, but this incentive may not actually encourage individuals to make the required lifestyle changes as daily change maintained is more difficult to achieve than attending a number of appointments. Thus it seems like rewarding the lifestyle changes would be more appropriate as it is the behavioural change that is the aim of counselling and it lies within the individuals' control. However, daily exercise is much more expensive and intrusive to monitor. Monitoring that relies on the individuals' self reports provides a perverse incentive that will trigger a reward. So the reward could be triggered by the desired outcome, weight loss or maintenance, and that is after all the risk factor of concern. Weight loss which relies on self report is similarly open to misreporting. However, it is relatively easy to monitor although it would impose administrative costs. However, it may be less within the individual's control and the effort (or extent of exercise required per unit of gain) may vary across individuals so that they do not receive equal reward for equal effort.

Most rewards are directed towards an individual. However, some programs have also made rewards dependent on the achievement of a goal by a group, thus attempting to enlist social support for individuals attempting to make difficult changes. While social support can be a positive reinforcer, there can be unintended effects if one person is alienated through being seen to fail the group achievement (Jochelson, 2007).

Finally timing is a further consideration. Incentive programs which target one-off behaviours, e.g. immunisation require one-off payments. Those which aim to change behaviour maintained over time could be on-going which makes them expensive or could be time limited. Time limited payments though introduce the perverse incentive problem. The behaviour may be seen as less worthwhile once the extrinsic reward is stopped with the result being that the behaviour is less practiced rather than more.

## 6 When do financial incentives work?

There has been increasing interest in the use of financial incentives in health promotion and prevention in the last six years, with a number of systematic reviews published in that period. Financial incentives can be effective in promoting behaviour change under certain conditions:

- Where cost is a barrier to the use of a service, such as charges for immunisations or well child visits
- Where the desired behaviour change is simple and one-time rather than complex and ongoing
- Where the financial incentive reinforces other strategies for change
- Where the incentive is not delivered in a negative or demeaning way.

Financial incentives have proved effective in encouraging immunisation, extending antenatal care to low income women, ensuring completion of tuberculosis treatment in homeless or drug using populations (Jochelson, 2007; Kane et al., 2004; Sutherland et al., 2008). However, physical activity and eating behaviours are complex requiring modification of actions that are repeated every day and require sustaining over a long period of time. The issue of overweight and obesity is also intrinsically involved in individuals' self image and self-esteem, increasing the potential for poorly designed incentives to have perverse effects.

## 7 Reviews of financial incentives for dietary and exercise change

A meta-analysis of incentives for weight loss found no effect of financial incentives on weight loss (Paul-Ebhohimhen and Avenell, 2008). The meta-analysis covered nine studies which used incentives often compared with educational, counselling or diet plans. Incentives trialled included refunds of deposits for attendance at sessions, cash bonuses for achieving goals and provision of free food. Although the authors conclude that there is weak evidence that financial incentives are more effective with increasing the size of the incentive, rewarding group performance rather than individual performance, and non-psychologists rather than psychologists delivering the rewards. This is a liberal interpretation as these results still failed to reach statistical significance. The inclusion criteria restricted the analysis to randomised controlled trials with weight loss as the outcome measure, guaranteed reward (as opposed to a lottery), with the ability to separate the effect of financial incentive from other aspects of the intervention. This reduced the scope to seven trials and as total sample sizes ranged from 49 to 175 with several arms in some studies, sample sizes were relatively small. It is also worth noting that five of the seven studies used negative incentives (contracts) rather than rewards.

Wall et al. reviewed the effectiveness of incentives in modifying dietary behaviour (Wall et al., 2006). This identified four studies (five articles) only one of which was included in Paul-Ebhohimhen and Avenell (2008). Their focus was also restricted to randomised controlled trials. Dietary change was measured by food purchasing or weight loss, or anthropometric measures. A wide range of financial incentives were covered including cash payments, the opportunity to win prizes in lotteries, coupons to exchange at farmers' markets, free food, and reduced pricing of low fat snacks in vending machines. Overall financial incentives were associated with changed food intake, the effect lessened over time or when the incentive (free food) ceased. It is interesting to note that the provision of grocery lists and meal plans was associated with weight loss, and adding free food did not significantly increase weight loss. However, studies were subject to selection bias and short periods of follow-up.

Kane et al. conducted a systematic review of randomised trials investigating the effect of financial incentives on a range of behaviours including diet, exercise and weight loss (Kane et al., 2004). Studies which could not separate the effect of financial incentives from other intervention components were excluded. This review identified 10 published papers with limited overlap with other reviews. The authors conclude that financial incentives in general work, but work more effectively for simple, well-defined behavioural changes. Changes in diet, exercise and weight loss are more complex. Financial incentives are associated with greater participation or attendance for example supervised exercise sessions or dietary counselling; however, changes in food intake or exercise patterns are difficult to observe and weight loss is often modest and not sustained over longer periods.

Sutherland et al. provide the most comprehensive report on incentives though it covers incentives for treatment compliance, preventive actions such as immunisation and screening as well as lifestyle changes (Sutherland et al., 2008). This review drew heavily on the other reviews particularly Kane et al. (2004) in the area of incentives to change lifestyle behaviours, though they did not limit their scope to randomised controlled trials. They conclude that changing prices at consumption points such as cafeterias and vending machines will increase the purchase of healthier alternatives. Financial incentives are effective in increasing participation in behaviour change programs, but these diminish once the reward is withdrawn; they also have some effect in inducing short-term changes but these diminish over longer periods.

## Other reports

Another recent discussion paper draws on a wider range of papers without restricting the scope to randomised trials (Jochelson, 2007). It concluded that the most successful incentives target simple behaviour, usually short term, time-limited, discrete actions. The effectiveness of a financial inducement appears to be related to its size. It found that overall incentives aimed at lifestyle choices increased participation in programs, but once the intervention ceased participants relapsed to previous behavioural patterns. Cash rewards can remove barriers to participating in healthier lifestyles (such as gym membership fees) and may be more important in groups with lower incomes. It recommended rewards over penalties, that is, positive reinforcement rather than punishment, and noted that losing a reward may reinforce an individual's sense of low esteem and thus hamper future efforts at change. It concluded that financial incentives may be more effective as part of multi-faceted strategy than used alone.

Goodman and Anise add another dimension to this body of evidence by considering observational studies and modelled analyses as well as trials; and considering macro-policy instruments including taxes, prices or subsidies enacted by government and local or site specific changes in prices (Goodman and Anise, 2006). Studies which have modelled changes in consumption using actual market data concluded that purchasing patterns respond to price, though the extent of the response should be expected to vary with incomes, availability and prices of other foods, and cultural factors. A longitudinal study from China (Gou X. et al., 1999) found large and significant responses in food consumption to changing prices. In the US a prospective observational study (Sturm and Datar, 2005) investigated the association between food prices and children's BMI, and the density of food outlets (restaurants, grocery and convenience stores); lower prices for fruit and vegetables were associated with lower increases in BMI.

## More recent literature

Since these reviews a number of other studies have been published. These studies (Finkelstein et al., 2008; Finkelstein et al., 2007; Volpp et al., 2008) confirm earlier findings: that financial incentives have been associated with short term weight loss in some programs and that the impact is increased if the incentive is larger. These conclusions must be treated cautiously. Unfortunately these studies suffer from the same limitations as earlier studies including volunteer bias and short follow-up.

A school based program developed in Wales has used peer modelling (videos featuring children who eat fruit and vegetables) and rewards (small gifts, free food), the Food Dudes Program (Horne et al., 2004; Lowe et al., 2004). This demonstrated increased children's consumption of fruit and vegetables although these evaluations were limited to four months (included in reviews (Goodman and Anise, 2006; Jochelson, 2007; Sutherland et al., 2008). Unfortunately there appear to no longer be follow-ups reported. A school based pilot program in Norway has demonstrated increased fruit and vegetable consumption when these foods are provided free with the increase in consumption continuing over the school year (Bere et al., 2005). Neither the Welsh nor Norwegian studies included weight or BMI measures. Although Norway has also provided subsidised fruit and vegetables in elementary schools, parents are required to enrol in the program and participation (of schools and children within schools) has been low.

A later study from the Food Dudes team applied the same model to increasing activity as measured by pedometers and found that the effect lessened once the intensive intervention stopped, although activity remained higher than in the control group schools (Horne et al., 2009). Again the follow-up period is short with the final measure taken two weeks after the low intensity intervention ceased. This is consistent with the view that incentives may be more effective in habit

forming in younger age groups, but given the short follow-up period this cannot be interpreted as evidence supporting the hypothesis. This hypothesis was more fully tested in recent studies but as yet only reported in a working paper (Charness and Gneezy, 2008). Two experiments enrolled volunteer college students, offered financial payments for gym use, and were able to track attendance from electronic records at the college sports centre for both pre- and post-intervention periods. Their results demonstrate that payment contingent on repeated gym use over a period of eight weeks increased participation and that for previously non-regular users that continued beyond the intervention period. However, by eight months post-intervention there is a non-significant rate of decline in attendance. Biometric data also showed an improvement in the intervention groups. In contrast financial incentives for the previously regular gym users were at best neutral and at worst associated with a decline in gym use. However, these were college students and volunteers although in volunteering they were not aware that the experiment required increased physical activity. This study thus supports both the crowding out and habit formation hypotheses.

As part of the German health reforms in 2004 sickness funds (insurers) have been allowed to offer bonuses for health promoting behaviour (Schmidt, 2007). The behaviours targeted covered screening, immunisation, check-ups and exercise. The exercise component offered credit points for participation in accredited fitness programs. Credit points can be redeemed for cash or for gifts such as a sports pack. Almost half of those who enrolled in the program included a component of exercise. The focus in this report is on savings in health care costs (Stock et al., 2008). The control group was drawn from the same insured population matched for age, sex, area of residence, insurance status and the previous year's health care costs. Cost savings from the perspective of the sickness fund (net of the cost of the program and bonuses) were achieved within 12 months. However, because German sickness funds pay capitation for ambulatory medical care any changes in doctor visits were not included. The program enrolled participants voluntarily and the comparison is with non-participants so the results are open to volunteer bias. Further, individuals who signed up for the program but did not participate in any components (perhaps due to acute illness) were excluded from the analysis. Other factors such as education, socioeconomic status or self-assessed health status were not known. Finally this paper does not analyse differences between the group who participated in the exercise program and others.

A similar approach has been adopted by PruHealth, a private insurer operating in the UK and South Africa. In this scheme lower premiums are offered to those who participate in healthy behaviours including diet and exercise. We have not identified any independent evaluations of this, but according to the company claims have been reduced among the health behaviour adopting group (Wilkinson, 2008). This is not surprising. Those who volunteer for participation in these programs are likely to be better risks than those who do not; so in effect this scheme allows the insurer to identify a better risk group. In fact it is not clear that this program encouraged additional exercise or whether participants just switched to those facilities or clubs sanctioned by the insurer.

## 8 Employment based programs

The idea that cost savings accrue from better lifestyles has also been used to advocate that employers subsidise health promotion programs. Healthier employees will improve productivity and absenteeism costs and in the US where employers meet the costs of health insurance may also reduce insurance outlays. For example, the US Department of Health and Human Services argued that:

*Employers are becoming more aware that overweight and obesity, lack of physical activity, and tobacco use are adversely affecting the health and productivity of their employees and ultimately, the businesses' bottom line. ...with benefit-to-cost ratios, ranging from \$1.49-\$4.91 (median of \$3.14) in benefits for every dollar spent on the program (US Department of Health and Human Services, 2003)*

But it is not clear how well scrutinised these 'evaluations' are. As Warner and Murt commented some 15 years ago, the profitability of such programs is by no means certain, there is little explicit discussion of what constitutes productivity gains and even fewer attempts to measure them (Warner and Murt, 1984). And the US Department of Health and Human Services has relied for its claims on the website of a private organisation which exists to promote wellness programs and does not provide references to back up its claims.

<http://www.sph.emory.edu/healthproject/mission/index.html>



## 9 Summary and conclusion

In sum, there is a growing literature on the role of financial incentives. Observational studies have shown that prices affect food selection and hence diet. Higher fat and carbohydrate dense foods are frequently more readily available and less costly than healthier alternatives; and both convenience (which can be considered a time cost) and price are associated with food consumption. There are an increasing number of controlled studies which investigate the relationship between financial incentives, participation in change programs, behavioural change, and weight loss. There are a number of shortcomings common to most studies in this area: small sample sizes, opportunity for selection bias, validity of outcome measures, particularly for behaviour change, short periods of follow-up. Studies are designed to test whether financial incentives are effective rather than what makes them effective and under what circumstances. Many studies have been targeted to middle-income groups and sample sizes have been insufficient for subgroup analyses by ethnic group, socioeconomic characteristics or other demographic variables. Finally few interventions provide a rationale for the design of the incentives. This is a non-trivial issue. There needs to be an inherent logic to determine what problem the incentive is addressing, what form and size it should take, and how it should be implemented. The lack of program logic means that the literature can provide some insight as to whether incentives work, but very little on what works under what circumstances; and so it is limited in supporting the development of new policy. There is almost no evidence on the cost-effectiveness of financial incentives.

### Nonetheless the evidence demonstrates that

- Financial incentives can be effective in changing behaviour but within a limited scope and context
- Financial incentives that target one-off and simple behaviours (which are more readily changed than complex habitual behaviours) have been shown to be effective
- Financial incentives are effective when they reduce or remove barriers to a desired behaviour
- Not surprisingly the effectiveness of financial incentives in general increases with the size of the incentive
- However, even for simple behaviour change, there are concerns about the distributional impact of incentives and how they are operationalised.

### However,

- Diet and physical activity fall into the complex category of behavioural change
- At best financial incentives have had some limited effectiveness in securing behaviour change and short term weight loss
- Financial incentives may be effective as a component of a multi-faceted intervention, but there has been little investigation of this.

### But

- The positive effects have not been maintained in the long term
- Financial incentives can more readily promote signing up for behaviour change than attendance at sessions, and more readily promote attendance than weight loss

- Financial incentives may have a perverse effect on those whose intrinsic motivation is high
- Financial incentives may support new habit formation and this seems more likely in young people
- Complex behaviour change often requires the development of knowledge and new skills and addressing these may achieve similar change without financial incentives.

## 10 References

- Anderson JV, Bybee DI, Brown RM, McLean DF, Garcia EM et al. 5 a day fruit and vegetable intervention improves consumption in a low income population. *J Am Diet Assoc* 2001;101(2):195–202.
- Banks G. Evidence-based policy-making: What is it? How do we get it? ANU Public Lecture Series, presented by ANZSOG. Canberra: Productivity Commission, 2009.
- Bere E, Veierød MB, Klepp KI. The Norwegian School Fruit Programme: evaluating paid vs. no-cost subscriptions. *Prev Med* 2005;41(2):463–470.
- Cameron J, Banko KM, Pierce WD. Pervasive negative effects of rewards on intrinsic motivation: the myth continues. *Behav Anal* 2001;24(1):1–44.
- Charness G, Gneezy U. Incentives to exercise. UC Santa Barbara Economics departmental working paper 11-08. Santa Barbara: UCSB Department of Economics, 2008.
- Drewnowski A, Darmon N. 2005. Food choices and diet costs: an economic analysis. *J Nutri* 2005;135(4):900–904.
- Drewnowski A, Specter SE. Poverty and obesity: the role of energy density and energy costs. *Am J Clin Nutr* 2004;79(1):6–16.
- Finkelstein E, Brown D, Brown D, Buchner D. A randomized study of financial incentives to increase physical activity among sedentary older adults. *Prev Med* 2008;47(2):182–187.
- Finkelstein EA, Linnan LA, Tate DF, Birken BE. A pilot study testing the effect of different levels of financial incentives on weight loss among overweight employees. *J Occup Environ Med* 2007;49(9):981–989.
- French SA, Jeffery RW, Story M, Hannan P, Snyder MP. A pricing strategy to promote low-fat snack choices through vending machines. *Am J Public Health* 1997;87(5):849–851.
- Frey BS, Jegen R. Motivation crowding theory. *J Econ Surv* 2001;15(5):589–611.
- Frey B, Oberholzer-Gee F. The cost of price incentives: an empirical analysis of motivation crowding-out. *Am Econ Rev* 1997;87(4):746–755.
- Goodman C, Anise A. 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? WHO Regional Office for Europe Health Evidence Network report [Internet] 2006 [cited 2 March 2009]. Available from <http://www.euro.who.int/document/e88909.pdf>
- Gou X, Popkin B, Mroz T, Zhai F. Food price policy can favourably alter macronutrient intake in China. *J Nutr* 1999;129(5):994–1001.
- Greene J. Medicaid efforts to incentivize healthy behaviors. Hamilton, New Jersey: Centre for Health Care Strategies, Inc., 2007.
- Horne PJ, Hardman CA, Lowe CF, Rowlands AV. Increasing children's physical activity: a peer modelling, rewards and pedometer-based intervention. *Eur J Clin Nutr* 2009;63(2):191–198.
- Horne J, Tapper K, Lowe F, Hardman C, Jackson C, Woolner J. Increasing children's fruit and vegetable consumption: a peer-modelling and rewards-based intervention. *Eur J Clin Nutr* 2004;58(12):1649–1660.
- Jeffrey RW, Wing RR, Thorsen C, Burton LR. Use of personal trainers and financial incentives to increase exercise in a behavioral weight loss program. *J Consult Clin Psychol* 1998;66(5):777–783.
- Jochelson K. Paying the patient: improving health using financial incentives. London: The King's Fund, 2007.

- Kane RL, Johnson PE, TownR J, Butler M. A structured review of the effect of economic incentives on consumers' preventive behavior. *Am J Prev Med* 2004;27:327–352.
- Lowe CF, Horne PJ, Tapper K, Bowdery M, Egerton C. Effects of a peer modelling and rewards-based intervention to increase fruit and vegetable consumption in children. *Eur J Clin Nutr* 2004;58(3):510–522.
- National Business Group on Health. Financial incentives for healthy lifestyles: Who's doing it, what's legal and where's the evidence? [Internet] 2007 [cited 25 February 2009]. Available from [https://www.businessgrouphealth.org/toolkits/et\\_financialincentives.cfm](https://www.businessgrouphealth.org/toolkits/et_financialincentives.cfm)
- Paul-Ebhohimhen V, Avenell A. Systematic review of the use of financial incentives in treatments for obesity and overweight. *Obes Rev* 2008;9(4):355–367.
- Redmond P, Solomon J, Lin M. Can incentives for healthy behavior improve health and hold down Medicaid costs? Washington DC: Center on Budget and Policy Priorities, 2007.
- Schmidt H. Personal responsibility for health – developments under the German Healthcare Reform 2007. *Eur J Health Law* 2007;14(3):241–250.
- Silow-Carrol S, Alteras C. Public programs are using incentives to promote healthy behavior. States in Action: A Bimonthly look at Innovations in Health Policy. NY, New York: States in Action Archive, The Commonwealth Fund, September/October 2007;11:2–5.
- Stock S, Stollenwerk B, Klever-Deichert G, Redaelli M, Büscher G et al. Preliminary analysis of short-term financial implications of a prevention bonus program: first results from the German Statutory Health Insurance. *Int J Public Health* 2008;53(2):78–86.
- Sturm R, Datar A. Body mass index in elementary school children, metropolitan area food prices and food outlet density *Public Health* 2005;119(2):1059–1068.
- Sutherland K, Leatherman S, Christianson JB. Paying the patient: Does it work? A review of patient-targeted incentives. London: The Health Foundation, 2008.
- US Department of Health and Human Services. Prevention makes common 'cents'. Office of the Assistant Secretary for Planning and Evaluation (ASPE), US Department of Health and Human Services. [Internet] 2003. Available from <http://aspe.hhs.gov/health/prevention/>
- Volpp KG, John LK, Troxel AB, Norton L, Fassbender J, Loewenstein G. Financial incentive-based approaches for weight loss: a randomized trial. *JAMA* 2008;300(22):2631–2637.
- Wall J, Mhurchu CN, Blakely T, Rodgers A, Wilton J. Effectiveness of monetary incentives in modifying dietary behavior: a review of randomized, controlled trials. *Nutr Rev* 2006;64(1):518–531.
- Warner KE, Murt HA. Economic incentives for health. *Annu Rev Public Health* 1984;5:107–133.
- Wilkinson E. Can you pay people to be healthy? *The Lancet* 2008;371(9621):1325–1326.
- Wing RR, Epstein LH, Marcus M, Shapira B. Strong monetary contingencies for weight loss during treatment and maintenance. *Behavior Therapy* 1981;12:702–710.

## 11 Appendix. Details of search strategy

A search was conducted simultaneously on Medline, Pre-Medline Publication date 1966-present, Embase Publication date 1980–present and PsychInfo publication date 1987–present. This search was conducted via the Ovid SP platform

### Strategy 1

1. exp reward/
2. "awards and prizes"/
3. financial incentive\$.mp. [mp=ti, ot, ab, nm, hw, tc, id, sh, tn, dm, mf]
4. monetary incentive\$.mp. [mp=ti, ot, ab, nm, hw, tc, id, sh, tn, dm, mf]
5. financial inducement\$.mp. [mp=ti, ot, ab, nm, hw, tc, id, sh, tn, dm, mf]
6. 1 or 2 or 3 or 4 or 5
7. health behavior\$.mp. [mp=ti, ot, ab, nm, hw, tc, id, sh, tn, dm, mf]
8. 6 and 7
9. limit 8 to English language
10. remove duplicates from 9

### Strategy 2

1. exp reward/
2. financial incentive\$.tw.
3. monetary incentive\$.tw.
4. health promotion.mp. [mp=ti, ot, ab, nm, hw, tc, id, sh, tn, dm, mf]
5. health education.mp. [mp=ti, ot, ab, nm, hw, tc, id, sh, tn, dm, mf]
6. 1 or 2 or 3
7. 4 or 5
8. 6 and 7
9. limit 8 to English language
10. remove duplicates from 9

Another search was conducted using Econlit Publication date 1969- present date. This was via the Ebsco Host platform

1. Financial incentive\$
2. Incentive\$
3. Reward\$
4. Motivation
5. 1 or 2 or 3 or 4
6. Behaviour change or behavior change
7. 5 and 6

The search engine, Google was also used to find relevant reports and grey literature. Search terms included 'financial incentives for behaviour change', 'financial incentives for behavior change', 'incentives for behaviour/behavior change', and 'incentives and behaviour/behavior change'.

The websites of all Australian State Departments of Health and the Ministry of Health, New Zealand were also searched in an effort to locate any information relating to incentive programs.

Hand searching of reference lists of relevant articles and reports was also conducted to obtain further papers.