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kicking bad habits

Paying the Patient

IMPROVING HEALTH USING FINANCIAL INCENTIVES

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Kicking Bad Habits: How can the NHS help us become healthier?

Individual responsibility for health and self-care are key themes in recent health policy documents in England. The Wanless review of health care funding (2002) showed that public engagement with health could help to reduce health care costs. *Choosing Health* (2004) looked at how information, services, retailers and marketers could make healthy lifestyles 'an easier option' for people. *Our Health, Our Care, Our Say* (2006) explored the future of health and social care based on an assumption of individuals managing their health and health care. These policies are based on a number of ideas:

- individuals should take greater responsibility for their health and care
- individuals should adopt healthier behaviours to avoid ill-health in later life
- if individuals do change their behaviours, the hope is that better health will reduce future health costs.

For the NHS and health practitioners working within it the challenge is how to support people to adopt healthier behaviours and avoid risky ones. Much of the published material on models of individual behaviour and change is based on theory rather than practice, and there is little consensus on the elements of successful interventions.

This programme explores both the theory and practice of behaviour change interventions and tries to answer the questions:

- what interventions are effective in encouraging healthy behaviour?
- how can the NHS help people become healthier?

As part of this programme, the King's Fund will produce a series of papers for wider input on:

- the impact of financial incentives
- the effectiveness of targeting low socio-economic groups
- the role of information-led strategies
- the impact of personal skills, capabilities and confidence to change
- strategies for identifying and targeting interventions.

Wider input into these papers will be sought through discussion and invited comment, and by the end of 2008 we will publish a final report that will bring all these discussions together and will make recommendations for the future.

This paper, *Paying the Patient: Improving health using financial incentives*, is the first in this series. The paper identifies programmes based on positive incentives that reward individuals directly for a desired behaviour or outcome and those based on negative incentives that discipline an individual by withdrawing a reward. It finds that financial incentives are effective in encouraging people to perform clearly defined, time-limited, simple behavioural tasks, such as keeping appointments, and also in encouraging participation in lifestyle programmes, but that the healthier behaviour is not maintained. Financial incentives are not effective when the behaviour change required is complex, for example, giving up smoking.

Introduction

The idea that money drives our behaviour is so much part of our culture that we rarely step back to think about it. Two-for-one deals on anything from cinema tickets to clothing, cut-price airline tickets or the promise of hefty annual bonuses drive our consumer and work–life choices. So the question arises, why not health behaviour? Certainly, we know that individuals smoke or drink less when the government increases tax on tobacco or alcohol (Jochelson 2006), but do they react the same way when financial incentives are part of targeted, personalised health promotion programmes? Could financial incentives on their own encourage people to eat less, exercise more, practice safe sex or visit the doctor when appropriate?

There is certainly growing interest in the possibility of using financial incentives to encourage behaviour change in the United Kingdom. The National Institute for Health and Clinical Excellence (NICE) recently published draft guidance on drug addiction, which advocated paying drug users to comply with drug cessation programmes (Nice 2007). Incentive schemes offering payment, prizes, vouchers and rewards are also used to target truancy and school absenteeism, promote educational achievement, deter crime and encourage healthier choices (Kavanagh *et al* 2005; Trouton *et al* 2005).

Internationally, new models of health care are emerging that rely on financial incentives to encourage individuals to become more responsible for their health. PruHealth and Discovery, health insurers based in England and South Africa respectively, offer clients reduced premiums if they participate in health-promoting activities such as exercise or screening programmes. The company believes that its members are healthier, and make fewer health claims as a result. Definity Health, part of the US UnitedHealth Group, rewards members who successfully manage chronic conditions with credits for health care. German social insurance companies reward members who take part in health screening or have a healthy lifestyle, with points redeemable for retail goods, cash or reduced premiums (Schmidt 2007). Incentive schemes are also emerging for the very poor. In the United States, recent changes to insurance and welfare law have led to new Medicaid programmes, which reward participation in health screening or disease management programmes with small financial payments that recipients can use to buy health-related products, and at least one programme offers both the incentive and a threat of reduced health benefits if individuals fail to comply. The idea is that incentives will encourage healthier lifestyles and reduce health care costs (Greene 2007; Rudowitz and Schneider 2006; Silow-Carroll and Alteras 2007). In several Latin American and Caribbean countries, the poorest families receive a 'co-responsibility' payment in return for participating in antenatal and child health care programmes and ensuring their children attend school; this has extremely positive results for children's health outcomes (Gertler and Boyce 2001; Maluccio *et al* 2005; Morris *et al* 2004).

These programmes are based on economic and psychological assumptions about what drives human behaviour. From an economic perspective, the incentive is assumed to increase the financial benefit of adopting a healthier lifestyle, over the costs of making the change, or it removes a barrier to adopting the desired lifestyle. From a psychological perspective, when motivation to change is low, a financial incentive offers an expectation of a reward for adopting a healthier lifestyle that in itself might not be sought after. However, as many of these programmes are new and not yet evaluated, hard evidence is lacking. To assess the potential impact of this approach, this paper surveys the literature looking at small-scale health promotion projects relying on financial incentives to change patient behaviour. It asks:

- what kind of financial incentives exist?
- do incentives encourage individuals to change their health behaviour?
- what makes financial incentive schemes successful?

Review of the literature

METHODOLOGY

This paper has reviewed 41 papers. Papers were identified in MedLine, PsycInfo and ASSIA by using the search terms 'incentive', 'reward', 'lottery', 'voucher', 'financial payment', 'smoking', 'weight loss', 'exercise', 'diet', 'medication adherence', 'immunisation' and 'addiction'. The paper used a snowball search strategy, following up relevant references from identified papers. Several papers included in this study would fail the stringent methodological requirements for a systematic review, but were included in this paper, which tries to scope out a relatively unexplored field.

What kind of financial incentives exist?

Two types of incentives emerge from the literature: positive and negative. Positive incentives reward individuals directly for a desired behaviour or outcome; they are affirmative enablers encouraging a desired behaviour. Out of 41 papers, 32 described examples of positive incentives. For example, some offered a small cash payment, grocery coupon, or lottery ticket to reward attendance at antenatal or mental health clinics (Laken and Ager 1995; Post *et al* 2006; Rice and Lutzker 1984), completion of long-term medication therapy (Beith *et al* 2007; Bock *et al* 2001; Malotte *et al* 1998; Pilote *et al* 1996; Tulsky *et al* 2000), take-up of immunisations (Achat *et al* 1999; Seal *et al* 2003), or enrolment in a screening programme (Slater *et al* 2005). Other incentives targeted lifestyle changes and offered small cash payments, stickers, T-shirts, or entry into lotteries with luxury goods, holidays or large cash payments as incentives. Incentives were used to encourage smoking cessation (Donatelle *et al* 2000; Hey and Perera 2005a; Hey and Perera 2005b), weight loss (Englberger 1999; Hennrikus and Jeffery 1996; Mavis and Stoffelmayr 1994), healthier food preferences (Anderson *et al* 2001; Horne *et al* 2004; Lowe *et al* 2004), increased exercise levels (Harland *et al* 1999; Jeffery *et al* 1998), safer sexual behaviour (Kamb *et al* 1998; Stevens-Simon *et al* 1997), and drug abstinence (Higgins *et al* 1994; Higgins and Wong 1998; Kirby *et al* 1998).

Negative incentives focus on the failure of an individual to adopt a desired behaviour and discipline the individual by withdrawing the reward, believing this will encourage adoption of the desired behaviour. The literature survey found just eight examples of this. Three studies examined weight loss (Jeffery and Thompson 1978; Jeffery *et al* 1984; Mavis and Stoffelmayr 1994) and five smoking cessation programmes (Elliott and Thomas 1968; Winett 1973; Paxton 1980; Rosen and Lichtenstein 1977; Jeffery *et al* 1993a). These asked participants to deposit a lump sum for a course of treatment; participants received back a payment if they met their goals, but forfeited it if they failed – an approach defined as 'behavioural deposit contracts' in the literature. One paper described a workplace smoking cessation scheme that withheld money from employees' paychecks if they tried but failed to cease smoking (Jeffery *et al* 1993a), while another described a scheme that offered a bonus to work teams if all its members did not smoke, but penalised the group if any individual lapsed (Rosen and Lichtenstein 1977 (cited in Hey and Perera 2005a)). Several studies enforced compliance with tuberculosis treatment by insisting on a deposit, partially or fully returned at the end of a completed course of treatment (Beith *et al* 2007; Hill and Ramachandran 1992). A final study examined the impact of reducing the value of a voucher to zero for patients on drug cessation programmes who failed to provide a clean urine specimen (Kirby *et al* 1998).

Do incentives encourage people to change their behaviour?

At first glance financial incentives do appear to encourage behaviour change, but they are not similarly effective across all types of behaviour.

The most successful schemes were positive incentives targeting 'simple behaviour', that is, the incentive encouraged or facilitated short-term, time-limited, discrete actions by the patient. For example, 86 per cent of patients with depression attended appointments when offered US$10 per appointment, compared to 69 per cent without the incentive (Post *et al* 2006). An offer of a small financial payment increased rates

of return to a tuberculosis clinic from 33 to 93 per cent among active drug users and from 53 to 84 per cent among homeless people in the United States (Malotte *et al* 1998; Pilote *et al* 1996). Financial payments, transport vouchers and food baskets increased successful completion of tuberculosis treatment in Russia and surrounding states, Latin America and some East European states (Beith *et al* 2007). Take-up of child immunisations increased from 6 to 23 per cent when parents were offered a lottery ticket to win a small cash reward, and take-up of flu immunisations increased from 20 to 29 per cent with an offer of a lottery ticket towards a $50 grocery voucher (Achat *et al* 1999). Completion of a course of hepatitis vaccinations by homeless men increased from 23 to 69 per cent when they were offered $20 a month for the six months of treatment (Seal *et al* 2003). Schemes describing negative financial incentives to promote compliance with long-term treatment also had a positive outcome; with 62 per cent of patients finishing treatment compared to 23 per cent not receiving the incentive in India (Hill and Ramachandran 1992), and an Indonesian study claiming just a 1 per cent default rate (Beith *et al* 2007).

Other positive financial incentives tried to encourage people to change particular lifestyle behaviours, such as smoking, eating, exercise, sexual behaviour and drug use. These behaviours may be termed 'complex' as they are habitual and ingrained in the texture of people's lives; they are often reinforced by norms in an individual's social network and may also satisfy psychological needs particular to each individual. Incentives aimed at complex behaviours were successful in that they increased participation in lifestyle change programmes, but once an intervention ceased, participants tended to relapse into former behaviour patterns.

Four systematic reviews of incentive-based smoking cessation programmes, based on a lottery style, offering participants a chance to win a large cash prize or luxury holiday, found that the incentive improved recruitment rates, and so delivered higher absolute numbers of quitters, but that the initial high cessation rates declined and participants relapsed when the rewards were no longer on offer (Bains *et al* 1998; Hey and Perera 2005a; Hey and Perera 2005b; Jepson 2000). Incentives also attracted people into weight-loss competitions that offered participants a chance to win a cash prize or lottery tickets but drop-out and relapse rates were high (Englberger 1999). A workplace weight-loss intervention found that minor prizes encouraged higher participation and low attrition rates (Hennrikus and Jeffery 1996). Financial incentives increased attendance at supervised exercise sessions (Harland *et al* 1999; Jeffery *et al* 1998) but overall had little impact on long-term maintenance of weight loss or exercise levels. Small financial payments also increased attendance from 9 to 58 per cent in a programme to reduce repeat teenage pregnancies and 37 to 55 per cent in a programme to reduce new diagnoses of sexually transmitted disease , but this did not lead to the desired health outcomes (Kamb *et al* 1998; Stevens-Simon *et al* 1997) Financial incentives also improved the retention and abstinence of patients attending a drug cessation programme (Higgins *et al* 1994; Higgins and Wong 1998; Kirby 1998; Klag *et al* 2005; Stevens *et al* 2003).

The negative incentives resulted in higher rates of smoking cessation and weight loss than in groups not offered the incentive, but several studies that measured long-term outcomes for weight loss found that receipt of an incentive and successful completion of a programme did not lead to long-term weight maintenance (Jeffery *et al* 1983; Jeffery *et al* 1984; Jeffery *et al* 1993a; Jeffery and Thompson 1978; Jeffery *et al* 1993b).

It is difficult to compare the outcomes of positive and negative sanctions as very few studies set out to do this, but the limited evidence suggests that penalising poor performance may reinforce individuals' sense of personal failure. Mavis and colleagues (Mavis and Stoffelmayr 1994) found no statistically significant difference in weight loss or attendance between groups who were offered positive or negative incentives, but those who lost money each week were more likely to drop out of the programme and less likely to attend the maintenance programme. Furthermore, about 70 per cent of the participants in this study preferred being rewarded for meeting goals compared to about 10 per cent who preferred losing a reward for failing to meet an agreed goal. The drug programmes that penalised participants for failing a urine test were also less successful than those that immediately rewarded the receipt of a drug-free sample (Kirby *et al* 1998).

What makes incentives successful?

Few studies explore the reasons for the success or failure of their incentive schemes. However, several themes emerge reflecting factors that may contribute to their success.

VALUE

The evidence suggests that the size of the incentive is important. Most of the incentives to encourage simple behaviours were offered to low-income patients, active drug users, or homeless people. The payouts, which ranged from a lottery ticket to a $25 draw, to $5 or $10 payments, were small but given poverty-level incomes, were attractive, and could defray the costs related to medical care. For example, Post and colleagues (Post *et al* 2006) found that patients used their $10 reward for attendance to defray their transport or childcare costs, while Laken and Ager (Laken and Ager 1995) found that the offer of gift certificate was not sufficient to ensure attendance when patients faced transport or financial problems. Incentives also lowered the economic barriers to entry to healthier lifestyles. Malotte and others (Malotte *et al* 1998) showed that 93 per cent of those who received $10 returned to a tuberculosis clinic for test results, compared to 85 per cent of those who received $5 and 33 per cent who received no financial incentive, suggesting that the higher-value incentive was most powerful. Also, Rice and Lutzker showed a similar outcome for 'middle-income' patients. Patients offered a free return appointment had a 97 per cent attendance rate, compared to 87 per cent offered a reduced price appointment and 70 per cent who received no incentive (Rice and Lutzker 1984).

The size of the incentive was also a significant inducement to participate in lifestyle interventions. Where interventions catered to low-income groups, it is evident that the financial incentive lowered the barrier of entry to the healthier lifestyle. For example, Anderson and colleagues (Anderson *et al* 2001) reported that providing $20 of farmers' market coupons to low-income women increased the likelihood that they visited the market and increased self-reported fruit and vegetable consumption. Harland (Harland *et al* 1999) found that patients from an inner-city low-income area were more likely to exercise if they received vouchers to a local leisure centre than just motivational interviews.

Even where studies did not specify the socio-economic breakdown of their target population the size of an incentive was still significant. Hey and Perera (Hey and Perera 2005b) suggested that the size of a lottery payout was significant in motivating smokers to enter 'quit and win' competitions. Stitzer and Bigelow (Stitzer and Bigelow 1984) found that smokers were more likely to smoke less when offered larger rewards: 26 per cent of smokers reduced their carbon monoxide levels to that of a non-smoker with the promise of a daily $12 reward compared to just 13 per cent of those promised $1.50. Petry and Martin (Petry and Martin 2005) noted a direct relationship between the magnitude of incentives and cocaine abstinence in cocaine-dependent patients. In contrast, Jeffrey and colleagues (1993b, 1998) suggested that the size of the incentive may have not been large enough to reinforce dietary change or new exercise habits (Jeffery *et al* 1983; Jeffery *et al* 1998).

As with positive incentives, it seems that the size of the negative incentive may be important. One uncontrolled study found that the larger the initial financial deposit, the more likely the patient was to complete treatment to regain his deposit (Hill and Ramachandran 1992). Jeffery and colleagues (Jeffery *et al* 1983) found that 71 per cent of middle-class men offered refunds of $10 per pound from deposits of $300 met their weight-loss goal compared to 38 per cent receiving $1 per pound from a deposit of $30, though all subsequently regained the weight lost.

TIMING

Few studies considered the timing of a reward. One study found that high-value vouchers received immediately after negative drug-free tests were more effective than low-value vouchers that increased in value with longer periods of abstention but were received a week after the test (Kirby *et al* 1998). A meta

review of incentive-based drug treatment programmes also found that more immediate voucher delivery and higher monetary value had a better effect (Lussier *et al* 2006). This suggests that both the value and the immediacy of feedback are important reinforcers of behaviour change. Warner suggested that periodic rewards are more effective than one-off rewards ((Warner and Murt 1984) cited in Hey and Perera 2005b), suggesting that a consistent incentive programme supports behaviour change.

SOCIAL SUPPORT

Lifestyle change is complex because it may challenge accepted behaviour in an individual's support and social network. There is extensive literature that shows that individuals adapt their behaviour to meet what they imagine are the expectations of people significant to them.

Most incentive schemes focus on the individual, but a few try to encourage support from the individual's social network. A smoking cessation scheme for low-income pregnant women offered women $5 for attending the programme and $25–$50 vouchers for her and her supporter for each month of abstinence. At 8 months 32 per cent of the pregnant women had quit, compared to 9 per cent of women not receiving the incentive, and two months post partum 21 per cent remained abstinent compared to 6 per cent (Donatelle *et al* 2000). Lowe and colleagues (2004) and Horne and colleagues (2004) showed that peer modelling and individual rewards in the Food Dude project increased children's consumption of fruit and vegetables in several programmes covering primary schools (Horne *et al* 2004; Lowe *et al* 2004). Their findings suggest that new peer norms supported with individual rewards were effective. Jeffery and colleagues found that individuals rewarded according to the weight-loss performance of a group lost more weight initially than individuals rewarded according to their individual performance, but this was not statistically significant. They were also less likely to regain the weight with no participants on individual, low contracts maintaining their weight loss at 12 months compared to 18 per cent of individuals in low, group contracts and 7 per cent compared to 23 per cent on higher contracts (Jeffery *et al* 1983). However, peer pressure can also have negative effects and may reinforce an undesired behaviour. A workplace smoking cessation programme that penalised the group for the failure of individuals increased friction in work teams and in some cases, though individuals complied in the short term with quitting, the experience confirmed their desire to remain smokers (Green *et al* 1986; Hey and Perera 2005a; Koffman *et al* 1998; Rosen and Lichtenstein 1977).

Finally, one study suggested that the way rewards were delivered could undermine or support the recipient's achievements. Lowe (2004) and Horne (2004) suggest that schemes that deliver rewards in a manner that is experienced as controlling or humiliating leads to the recipient devaluing that activity. They found that rewards should signify success, be offered as marks of achievement and given with praise and encouragement (Horne *et al* 2004; Lowe *et al* 2004).

SKILLS

Individuals need skills and confidence to enact a proposed change, particularly with lifestyle behaviours. Bandura, for example, suggests that self-efficacy determines how people set goals for themselves, how much effort they put into achieving the goals, and their persistence and resilience to failure. People with a strong belief in their own capabilities exert greater effort when they fail, while those who distrust their abilities give up quickly (Bandura 1995). Thus, drug addiction programmes offering financial incentives for abstention also offered therapy and living skills to build the ability of the drug user to live independently (Higgins and Wong 1998). An exercise programme was most successful among individuals given vouchers and motivational interviews to help them decide on their goals and action plans (Harland *et al* 1999). Two studies found that participants in quit and win competitions given personalised feedback to improve their skills and confidence in their ability to set and hold to pragmatic goals, and link their behaviour to their desired outcome, were twice as likely to remain abstinent after the competition as a control group (Curry *et al* 1990; Curry *et al* 1991). The additional feedback, they suggested, improved individual's self efficacy and

reinforced their intrinsic motivation to quit. Incentives that reward desired behaviour immediately also seem to develop competence.

Rewarding appropriate goals also builds the potential for success. For weight-loss programmes using both positive and negative incentives, participants lost more weight when they were rewarded for achieving agreed weight-loss goals, rather than simply for attendance, and the group rewarded for reaching their goals was more likely to attend a voluntary, free weight maintenance programme (Jeffery *et al* 1983; Jeffery and Thompson 1978; Mavis and Stoffelmayr 1994). In contrast, a payment for attendance at sexual health education sessions did not reduce teenage pregnancies or sexually transmitted infections, possibly because the incentive rewarded one behaviour – attendance – in the hope that information gained at educational sessions would change norms about sexual behaviour, but did not reward the desired outcome (Kamb *et al* 1998; Stevens-Simon *et al* 1997).

Discussion

This paper began by asking whether financial incentives are an effective mechanism to drive behaviour change. The answer, it seems, is a qualified 'yes'. This review suggests: first, that financial incentives are effective in encouraging people to perform clearly defined, time-limited, simple behavioural tasks; second, that they encourage participation in programmes to bring about healthier lifestyles, but that this does not seem to lead to long-term maintenance of the healthier behaviour. Incentives help individuals achieve their goals, but once the incentive is removed, they tend to relapse into previous behaviour patterns. No evidence was found exploring whether sustained incentives offered over a long period of time might reinforce new behaviours. And the evidence base was too poor to compare the relative impact of positive and negative incentives.

These findings are supported by three reviews of the impact of incentives on health behaviour. One study found that in 10 of 11 reviewed papers, incentives promoted adherence to medication or screening, defined as simple behaviours by this review (Giuffrida and Torgerson 1997). A systematic review found that in the short run, economic incentives are effective for simple preventive care and well-defined behavioural goals, but that there was insufficient evidence to show that economic incentives were effective for promoting long-term lifestyle changes (Kane *et al* 2004). Finally, a meta-analysis of a range of interventions for disease management programmes found that financial incentives improved control of chronic diseases such as depression and hypertension, though evidence was insufficient to assess the relative effectiveness of financial incentives against other interventions (Weingarten *et al* 2002).

There are no simple answers to explaining why financial incentives appear to be effective for certain behaviours but not for others. Explanations depend partly on one's understanding of human behaviour and decision-making. From an economic perspective, people will take a particular action when the benefit outweighs its cost. Many of the studies cited earlier showed that for low-income groups, even a small subsidy can have an impact on behaviour, for example, by offsetting the cost of transport to a health care centre. In an economist's terms, low-income groups have greater price elasticity around health behaviours, that is, they are more sensitive to price changes and a small incentive may be sufficient to encourage action. But to understand the limits of the use of financial incentives to promote behavioural changes, one needs to turn to behavioural economists' insights into why individuals make apparently 'irrational' decisions that appear contrary to their self-interest and welfare (New Economics Foundation 2005).

Kahneman and Tversky have shown that far from making decisions that optimise outcomes, individuals use 'heuristics' or rules of thumb to make decisions in complex situations. Individuals make decisions about risks and probabilities based on past experience and personal anecdote rather than statistical probability (Tversky and Kahneman 1974). People are also loss averse and hang on to what they consider 'theirs', even if the costs outweigh the benefits (Kahneman *et al* 1991). People also give current events and

experiences more weight than far-off ones – a phenomenon known as discounting – and prioritise self-gratification because they assume they can make different choices later (O'Donoghue and Rabin 2000).

This more complex approach to decision-making and behaviour may help to explain the limits of financial incentives for health promotion interventions. A financial incentive may not help people adopt a healthier lifestyle as they may 'see' lots of evidence of friends and family who appear healthy despite overeating, smoking or not exercising, and their future ill health is too far-off to worry about. They may be unable to relinquish the pleasures of current habits, but believe they will do so in the future. They may choose to ignore a positive incentive or accept the sanction of a negative incentive as the 'price' to pay for continuing with unhealthy but enjoyable behaviour. Finally, incentive schemes deal with an individual separately from their social context. The small financial benefit – even where it allows entry into a lifestyle behaviour – may not be sufficient to counteract the wider pulls of social context, personal habit or psychological dependence on a behaviour.

From a psychological perspective, the limitations of financial incentives are to do with the impact of rewards on motivation. Activities we do for enjoyment and interest, and as an end in themselves, are driven by intrinsic motivation. Activity driven by outside incentives or threats is motivated by extrinsic motivation. Reward-based systems that reward performance may undermine intrinsic motivation and be experienced as controlling, but rewards that convey feedback about competence may enhance intrinsic motivation and reinforce an individuals sense of autonomy (Cameron, *et al* 2006; Cameron and Pierce 1994; Deci *et al* 1999). Frey suggests that financial rewards crowd out intrinsic motivation, especially where they are perceived as controlling (Frey 2001).

Thus, the failure of financial incentives to drive long-term behaviour change may well be due to incentives focusing participants' attention on the reward, so that when the intervention ends individuals have little inclination to continue the behaviour. As the new behaviour is not driven by intrinsic motivation, when the external motivator the incentive is removed, people relapse into their previous behaviour patterns. Interventions that offered training to improve self-efficacy and other life skills, as well as a reward, reported better long-term outcomes, possibly because they reinforced intrinsic motivation. The link between rewards and self-efficacy may also explain why negative incentives are less successful. As participants in the negative sanction interventions are aware they have problems with weight, exercise or drug use and were willing to try to change, when they fail to reach their target the sanction reinforces their personal failure. Negative incentives highlight the shame of failure and, rather than building competency, confirm low expectations about the self.

The final issue affecting the impact of financial incentives is the social context of behaviour. A financial incentive can help to offset the direct or indirect costs of behaviour change, but this is just one element determining an individual's behaviour choices. Lifestyle behaviours reflect individual choice, but these choices are influenced by social context. For example, people's dietary habits are shaped by advertising, cost, social norms and emotional needs, and their ability to exercise is influenced by their commuting patterns, the safety of the environment and whether the environment feels safe. A health promotion intervention relying largely on a financial incentive to change behaviour ignores the complex range of contextual factors that influence health behaviour.

Conclusion

With obesity on the increase, and rates of diabetes, stroke and heart disease likely to rise, public health practitioners are concerned to find effective interventions that encourage individuals to eat more healthily, exercise more, quit smoking or reduce their weight in the hope of reducing the burden of future ill health. Health programmes that rely on financial incentives as a lever to promote healthier behaviour are attractive as they are simple and easy to implement. However, this review suggests that financial incentives are effective in limited circumstances where the tasks are simple and time limited, and less

effective where the behaviour change required is complex. The use of financial incentives to promote better use of health care services and take-up of health promotion should be applied selectively. On their own, financial incentives are of limited use and can overcome barriers to participation by offsetting costs, and if tied to the attainment of one-off goals rather than maintenance of behaviour. Financial incentives may be useful as one element of a multi-faceted programme that addresses the complexity of individual, social and economic factors that affect human behaviour. However, the existing evidence base is too limited to make definitive conclusions about the conditions under which incentives are effective. Further research is needed to understand when incentives are likely to be most effective in encouraging the adoption of healthier behaviours and whether long-term incentive schemes can enable people to maintain changes in behaviour.

TABLE 1: IMPACT OF POSITIVE INCENTIVES

Paper	Population	Research Design	Target behaviour	Incentive	Outcome with incentive compared to control group without incentive
Attendance					
Laken and Ager 1995	Low-income pregnant women, US	Clinical trial	Antenatal clinic attendance	$5 gift certificate and entry into $100 raffle	No difference compared to control group
Rice and Lutzker 1984	Middle-income patients, US	Convenience sample	Return appointments	Free or reduced cost appointment	97% attend vs 70% (if offered a free appointment) 87% attend vs 70% (if offered a reduced cost appointment)
Post *et al* 2006	African-American patients with depression, US	Convenience sample	Attend appointments	$10 per appointment	86% attend vs 69%
Medication adherence					
Malotte *et al* 1998	Active drug users, US	Purposive sample randomised to different schedules	Return appointment for tuberculosis test results	$5 or $10	93% of those receiving $10 returned for skin test reading, compared with 85% who received $5 and 33% who received no monetary incentive An education session had no impact on return for skin test reading
Pilote *et al* 1996	Homeless patients, US	Randomised clinical trial	Return appointment for tuberculosis treatment	$5	84% receiving incentive attend compared to 75% assigned to peer health adviser and 53% assigned to usual care (referral slips and bus tokens)
Achat *et al* 1999	Low-income patients	Literature review	Take-up of flu and childhood immunisation	Entry into lottery to win grocery vouchers of $50 or lottery of $25 to $100	Groups receiving incentives had immunisation rates of up to 17% higher than comparison groups
Slater *et al* 2005	Low-income women	Randomised control trial	Enrol in mammography screening	$10 incentive if enrolled within a year	Higher enrolment
Bock *et al*	Tuberculosis	Convenience	Regular	$5 grocery coupon	60% of patients with incentives completed

2001	patients, US	sample	attendance for 32 week directly observed treatment (DOT)		therapy in 32 weeks compared to 19% of control 89% completed therapy in 52 weeks compared to 52% of the control group
Tulsky *et al* 2000	Homeless tuberculosis patients, US	Randomised control trial	Regular attendance for DOT	$5	44% complete treatment vs 26%
Seal *et al* 2003	Homeless men, US	Randomised control trial	Complete hepatitis B vaccine course	$20 a month for six months if complete 3 vaccinations	96% attend for second dose vs 63% 69% attend for third dose vs 23% Incentive more effective than outreach
Smoking					
Hey and Perera 2005a	Smokers	Systematic review	Quit smoking	Quit and win lottery-style competitions	Increased participation Similar quit rate to control High relapse rate
Hey and Perera 2005b	Smokers	Systematic review	Quit smoking	Quit and win lottery-style competitions	Increased participation, higher quit rate than control High relapse rate
Bains *et al* 1998	Smokers	Review	Quit smoking	Incentive-based population interventions offering cash or holiday prizes	Reach a large group of diverse smokers, though possibly already motivated to quit Quit rates initially high (34% at one month) but decrease over time (23% at one year)
Jepson 2000	Health-related behaviours including smoking	Review of reviews			Not enough evidence of an effect
Koffman *et al* 1998	Aerospace industry employees, US	Quasi-experimental design	Smoking	Multi-component programme including self-help package, and telephone counselling. Incentive competition programme also included cash incentives and team competition for the first five months of the programme. The traditional programme offered standard smoking cessation. Incentive participants paid a $50 fee to join and	Incentive programme had a smoking abstinence rate of 41% at six months, which was significantly higher than 23% in the multi-component programme and 8% in the traditional programme. At 12 months the quit rates for the incentive and multi-component programmes were statistically indistinguishable (37% vs 30%) but higher than traditional programme (11%)

				earned $15 a month for abstaining. Participants who relapsed lost the $15, which was added to $2,500 grand prize. Participants earnings tallied as team earnings and three highest earning teams eligible for grand prize.	Individuals in incentive competition group came under pressure from team colleagues to quit smoking
Donatelle *et al* 2000	Low-income pregnant women, US	Randomised controlled trial	Smoking	$5 for attendance $25–$50 voucher each month of abstinence for self and supporter	Eight-month gestation quit rate 32% vs 9%. Two-month post-partum quit rate 21% vs 6%
Diet					
Hennrikus and Jeffry 1996	Workplace	Review	Overweight	Rewards, eg, T-shirts and competitions	Higher participation, lower attrition
Englberger 1999	Obese people	Descriptive	Weight loss	Lottery-style competition	Increase participation, high drop-out rate and high relapse rate
Mavis and Stoffelmayr 1994	101 obese people	Self-selected sample randomly assigned to different treatments	Weight loss	$8 rewards for attendance or for achieving weekly weight-loss goal, or earn extra lottery ticket for meeting weight-loss goal	Attendance reward group less likely to achieve weight-loss goals. Group getting reward for weight loss more likely to attend maintenance programme
Jeffrey *et al* 1993b	Obese patients	Purposive sample randomised to different treatment groups	Weight loss	Standard behavioural treatment plus monetary incentive ranging from $2.50–$25 per week dependent on weight loss, or incentive and free food	Incentive group outperforms control group. Incentive withdrawn at end of programme. At 30 months all groups regained weight with convergence to control group
Jeffery *et al* 1983	Obese middle-aged men	Random sample of 20	Weight loss	Education programme plus monetary deposits of $30, $150 and $300. Individuals and groups reaching weight-loss goals rewarded with $1, $5 and $10 per pound respectively	71% of largest individual refunds met weight goals compared to 38% on smallest refund. 77% of individuals rewarded according to average group weight loss with a high refund also met goal compared to 47% of those rewarded with lower refund. Individuals in group contract lost more weight than individual but this was not statistically significant. By 12 months the difference between the groups had disappeared and

					weight was regained. Those rewarded according to group performance were less likely to regain all the weight, but the sample was too small to be statistically significant.
Lowe *et al* 2004; Horne *et al* 2004	Primary school children	Experimental	Increased fruit and vegetable consumption	Peer modelling plus rewards such as stickers, badges and pencils	Increased consumption of fruit and vegetables at school and at home on weekdays. Also, increased liking for fruit and vegetables
Anderson *et al* 2001	Low-income women	Randomised control trial	Increase fruit and vegetable consumption	$20 farmers' market coupon	More likely to visit market Self-report indicates increased consumption
Exercise					
Jeffery *et al* 1998	Obese patients, US	Purposive sample randomised to different treatment groups	Increase physical activity	Financial incentive of $1–$3 per walk plus personal training	Incentive increased attendance No long-term weight loss except in group receiving 'standard behavioural therapy' only and no incentive
Harland *et al* 1999	Low-income patients, UK	Randomised control trial	Increase physical activity	Motivational interviews and leisure centre vouchers	More likely to exercise if received both interventions Activity level not maintained after a year
Sexual health					
Stevens-Simon 1997	Teenage mothers, US	Randomised control trial	Attend peer-support programme to prevent repeat pregnancies	$7	58% attended vs 9%. No difference in repeat pregnancy rate
Kamb 1998	STI patients, US	Convenience sample	Attend four risk counselling sessions	$15 or voucher of equivalent value	Vouchers increased attendance 55% attend all sessions vs 37%. But both groups had similar post-enrolment STD rates
Drug cessation					
Higgins *et al* 1998	Cocaine users, US	Literature review	Abstain from drug use	Retail vouchers with therapy and living skills	Improved treatment retention and abstinence.
Higgins *et al* 1994	Cocaine users, US	Purposive sample randomised between	Abstain from drug use	Retail vouchers	Improved treatment retention and abstinence. 75% of patients receiving vouchers completed 24-week treatment

		experiment and control group			programme compared to 40% in group without vouchers and average abstinence was 11.7 weeks compared to six weeks
Kirby *et al* 1998	Cocaine users, US	Convenience sample, experimental design	Abstain from drug use	Low but increasing value vouchers compared to high-value vouchers increasing as patients progress	Low-value vouchers reduced to zero with a positive urine test produce no improvements relative to counselling. Increasing high-value vouchers with increased requirements for patients result in longer periods of cocaine abstinence (6.9 weeks vs two weeks)
Lussier *et al* 2006	Substance misuse disorders	Systematic review	Abstain from drug use	Incentive-based treatments to encourage abstention, attendance or medication compliance	Voucher size and immediacy associated with greater impact of incentive. Incentives also had a positive impact on clinic attendance and medication compliance
Petry and Martin 2005	Cocaine users	Convenience sample randomised to standard and incentivised treatment	Abstain from drug use	Patients earn increasing number of draws for attendance at group sessions and for negative urine samples. The latter were reset to one draw with two negatives samples. Draws entered into a lottery of prizes of varying values	Incentive decreased cocaine use and increased therapy attendance. At 24-week follow-up 13.5% of standard group remained abstinent compared to 35.5% of the incentivised group

TABLE 2: IMPACT OF NEGATIVE INCENTIVES

Paper	Population	Research Design	Target behaviour	Incentive	Outcome with incentive compared to control group without incentive
Smoking cessation					
Hey and Perera 2005a citing Rosen 1977	Employees	Review	Smoking cessation	Salary bonus for smokers and non-smokers who do not smoke at work	25% quit rate at work, but peer pressure caused friction as group was penalised for individual lapse
Jeffery *et al* 1993a	Employees	Randomised trial	Smoking cessation and weight loss	Behaviour modification plus money withheld from paycheck if failure to meet goals. Minimum of $5 per month. If goal met, money returned to employee	Incentive group greater smoking abstinence than control without treatment

Paxton 1980	50 local residents, England	Self-selection and doctor referral	Smoking	Deposit of £20 repaid at £5 a week if abstinent followed by deposit of £20 repaid at £10 fortnightly	At one month 80% on contract abstinent compared to 55% without contract but difference disappeared by three months
Winett 1973	45 local residents, US	Self-selected	Smoking	Deposit of $55 returned if abstinent	More likely to reduce or cease smoking with contract than without
Elliott and Tighe 1968	University students and staff, US	Self-selected	Smoking	Deposit of $50–$65 returned following successive periods of abstinence	37% abstinent at end of contract
Diet					
Jeffery *et al* 1993b	Overweight adults, US	Randomised trial	Weight loss	Free pre-packaged meals or financial incentive. Maximum payment of $25 a week if reached weight-loss goal. Minimum payment of $2.50 if not gained weight. $12.50 payment if reach 50% of goal	Provision of food led to higher weight loss than group with standard behavioural therapy. Incentives had no additional effect. No method led to long-term maintenance of weight loss
Jeffery *et al* 1978	31 obese people	Experimental study, purposive sample	Weight loss	Deposit $200 plus 10-week educational programme. Return $20 per week if attend meetings, met calorie restriction goal or met weight-loss goal. Control group made no monetary deposit	Weight and calorie contract groups lost more weight than attendance group. Attendance did not differ between groups. The no-contract control group had a high drop-out rate
Jeffery *et al* 1984	115 obese people	Experimental study, purposive sample	Weight loss	Three interventions all deposited $150 and received 16-week instruction on nutrition, exercise and behaviour. Control group had deposit refunded at initial session. Constant contract condition received $30 for each 5lb increment of average group weight loss. Increasing contract condition received refunds for successive 5lb increments of $5,	Two contracts lose more weight than control, but weight gain in maintenance period did not differ by contract type

				$10, $20, $40 and $75. Voluntary maintenance programme required a $100 deposit returned in $25 increments for attendance at quarterly assessment sessions for control and six relapse prevention group sessions and weekly problem solving sessions for the year	
Hill and Ramachandran 1992	Tuberculosis patients	Convenience sample, uncontrolled	Compliance with medication	Deposit made at beginning of treatment and returned at conclusion. Deposit meant access to cheaper drugs	62% finished treatment compared to 23%. The larger the deposit the more likely the patient was to complete treatment
Mavis and Stoffelmayr 1994	Obese people	Convenience sample randomly assigned to different treatments	Weight loss	Loss of $8 from $80 deposit or loss of lottery ticket if did not reach weight-loss goals.	More likely to drop out of programme compared to participants rewarded for achieving weight-loss goals. 72% of participants prefer reward for meeting goals compared to 11% preferring loss of reward if did not meet goal
Kirby *et al* 1998	Cocaine users, US	Convenience sample, experimental design	Abstain from drug use	Low but increasing value vouchers reduced to zero with a positive urine test	Vouchers did not improve participation, retention or abstention relative to counselling only programme

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