

Behavioral–Based Interventions for Improving Public Policies

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Chapter 3

Commitment Devices for Health: Theory and Evidence on Weight Loss

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ABSTRACT

This chapter examines how and why commitment devices have been used for weight management and frames research priorities going forward. A theoretical framework drawing on Thaler and Shefrin motivates the use of commitment devices to change health behaviours. An original taxonomy separates commitment devices into three distinct types. A review of the empirical literature, with a focus on unexpected findings that defy theoretical predictions, indicates that commitment devices (1) can have positive effects on health behaviours, but (2) can also have unintended effects, which warrants further research attention to under-theorised issues of ‘commitment overload’ and ‘moral licensing’, and empirical testing of online commitment strategies. The COVID-19 pandemic emphasises the need for innovative but evidence-based digital health interventions. The chapter closes with suggestions for policymakers considering commitment devices for preventative health behaviours.

INTRODUCTION

The growth and trajectory of obesity has led to its being described as a public health ‘epidemic’ (Butland et al., 2007, p. 17; Johnson, Li, Kuh, & Hardy, 2015), with severe consequences in the decades to come if effective action is not taken. The problem is not confined to richer nations, and the WHO uses the term “globesity” to convey the “escalating global epidemic of overweight and obesity” (WHO, 2015). Policy makers appear to be more willing to address the ‘obesogenic environment’ through sugar taxes and advertising bans, but these policy measures ultimately rely on individual-level behaviour change to deliver sustained weight management and public health improvements (Forman & Butryn, 2015).

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There are numerous resources to help individuals identify and tailor healthy behaviours to their lifestyles. But to really work, any health plans need to be sustained over time, and this is where the time inconsistency problem might arise: how to stay on track with a health goal where the costs of behaviour change are both immediate and substantial, while the benefits are delayed to an uncertain future? Preventative health behaviours, such as staying on a balanced diet and taking regular physical exercise, involves intertemporal choices: trade-offs between satisfying our current desires and achieving our longer term objectives (Rogers, Milkman, & Volpp, 2014). Faced with such a trade-off, it is easy to choose a short-term gain over future wellbeing (O' Donoghue & Rabin, 1999). Such 'present bias' can explain the failure to follow up on good intentions with concrete action (Liu, Wisdom, Roberto, Liu, & Ubel, 2014), and has been linked empirically to weight management issues (Fan & Jin, 2013).

Commitment devices – strategies to influence your future choices for the better – are expected to combat time inconsistency (Strotz, 1955; Thaler & Shefrin, 1981), and support the achievement of health goals (Liu et al, 2014). They belong to a wider set of ideas in behavioural public policy designed to address the biases that lead to poor decision-making. Thaler and Shefrin (1981) applied their planner-doer framework to time-inconsistent behaviour around economic choices. This chapter extends their framework to preventative health behaviours. Like savings behaviours, preventative health behaviours require some investment today – time, money, effort, leisure or pleasure foregone – in order to reap the benefits many years from now. People make plans with their future good health in mind. When the moment comes to adopt that preventative behaviour, they may find themselves deviating from those plans because, at that moment for action, the costs loom large relative to the benefits. A gap opens up between intentions and actions (Rogers et al 2015), with adverse consequences for long run health and wellbeing. If commitment strategies can help keep people on track with their plans for preventative health behaviours, they may have a role to play in public health programmes (Savani, 2019).

Commitment devices have been shown to promote smoking cessation (Gine, Karlan, & Zinman, 2010; Halpern et al., 2015), exercise (Prestwich et al., 2012; Royer, Stehr, & Sydnor, 2015) and a switching to safer water sources (Inauen, Tobias, & Mosler, 2014). Where commitment devices have been tested as weight management aids they have shown some promising results.¹ Financial commitment devices in the form of a deposit contract stake money on achieving a weight loss outcome have been shown to have positive short term effects (Volpp et al., 2008). An alternative form of commitment device relies on reputational rather than monetary stakes, and these too have been shown to promote weight loss: Nyer and Dellande (2010) report improved weight loss when goals are posted to a public gym noticeboard; Prestwich et al (2012) report greater weight loss when exercise is planned with a partner rather than as a solo activity. However, other studies have shown more mixed results from planning and commitment strategies (Chapman, Campbell, & Wilson, 2015; Verhoeven, Adriaanse, Ridder, Vet, & Fennis, 2013).

Questions remain around the impact of reputational commitment devices, and in particular how commitment devices may promote weight loss in a digital context. Recent studies highlight the considerable potential of digital interventions to improve health, and their increasing application to a wide range of health issues including weight management (Alkhalidi, Hamilton, & Murray, 2016; Murray et al., 2016); but few studies test commitment devices in an online setting or as part of an online health programme. The gap is all the more stark as the importance of eHealth services have grown with the outbreak of Covid-19.

The global pandemic provides critical context for the subject of commitment devices for weight loss. Firstly, and though there is much we do not yet know about the links between Covid-19 and obesity, scholarly discussion suggests obesity and diabetes are risk factors for more severe effects from the virus

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(Dietz & Santos-Burgoa, 2020; Sattar, McInnes, & McMurray, 2020). Taking steps towards improved diet and a healthy weight then take on even greater importance. Secondly, in the absence of a vaccine, many governments around the world have implemented restrictive ‘lockdown’ measures on the movement and interaction of people in order to curb the spread of the virus. Social distancing has amplified the value of online interaction for wellbeing and a healthy lifestyle. An array of digital technologies have been deployed for public health surveillance, contact tracing, and public health messaging on Covid-19 (Budd et al., 2020). This has arguably carried health even deeper into the digital domain, with people more accustomed to using or being asked to engage with digital tools. It is not surprising, then, that the pandemic is pronounced a “turning point” for eHealth (Wind, Rijkeboer, Andersson, & Riper, 2020). Together these contextual factors galvanise the study of commitment devices in digital behaviour change programmes.

This chapter provides an overview of commitment devices for weight loss, and aims to answer questions around how commitment devices work, where they have been found to be successful, and what researchers and policy makers should do to improve the evidence base and make optimal use of commitment devices for public health. It proceeds as follows. Section two conceptualises how commitment strategies might work by applying Thaler and Shefrin’s (1981) dual-self theory of behaviour change to support health goals, and specifically weight management. The third section organises commitment devices for weight loss into three types. The taxonomy highlights differences in the nature and intensity of the commitment strategy, of their likely influence on behaviour change, and reviews the empirical evidence against each type. The fourth section summarises findings from a field experiment testing the effects of a reputational commitment device on weight outcomes in a digital health setting (Savani, 2018). The study challenges neat predictions from theory that increasing commitment boosts health outcomes, and generates important questions around four issues: the potential for ‘commitment overload’; the nexus between wellbeing and adherence to commitment devices; the interaction between online and offline interventions and commitment strategies; and the scope for ‘moral license’ effects to unwind any positive effects of commitment devices.

PLANNER DOER THEORY FOR HEALTH BEHAVIOUR CHANGE

For many people, the experience of setting out to establish healthy habits is swiftly accompanied by the realisation that their future self will not always follow the plan they make today. In essence this is a time inconsistency problem: how to stay on track with a health goal where the costs of behaviour change are both immediate and substantial, while the benefits are delayed to an uncertain future. Considering the individual through a dual-self lens sets up a plausible battle between immediate and delayed gratification.² This internal tussle is explicitly modelled by Thaler and Shefrin (1981) in their planner-doer framework. An individual is understood to be composed of dual sub-selves, a far-sighted planner and a myopic doer, who disagree over how to maximise utility. The doer sub-self cares only for current utility, while the planner sub-self aims to maximise life time utility.

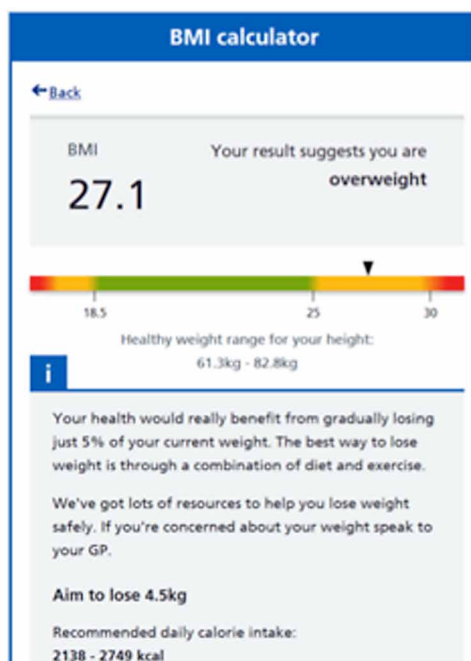
The outcome of these internal battles are manifest in health outcomes, for example weight or body mass index (BMI) status, which reflect whether the individual behaves in a way that promotes long term health benefits or succumbs to short term desires. Put differently, health outcomes can reflect whether the doer or planner has dominated decision making, since where a doer dominates, the individual is more likely to exhibit present bias, by over emphasising immediate gains over longer term payoffs (Loew-

enstein, Asch, Friedman, Melichar, & Volpp, 2012; O’ Donoghue & Rabin, 1999). Health behaviours thus provide fertile ground for investigating time inconsistency and commitment devices, because they implicitly rely on intertemporal choices.

Consider the following scenario. Paul is 38 years old and works in an office. He believes he is fairly active, with 2.5 hours of exercise a week in the form of gentle walking. He weighs 90kg, and at his height of 182cm his body mass index is 27.1. This means he is ‘overweight’. At a routine health check he receives advice from his doctor to lose weight to return to a ‘normal’ BMI. When he gets home, he browses online and confirms that he weighs more than is good for his long-term health.

Figure 1. Tools are readily available to understand the behaviour change needed

Notes: infographic taken from NHS website, accessed 7 Aug 2019.



Paul recognises the benefits of eating a more nutritious diet, with sensible portion sizes, and taking more exercise. He makes a mental note to try and lose a few pounds over coming months. But he maintains the old habits, forgetting or resisting small opportunities to be more active or choose lower calorie alternatives to the usual meals and snacks. At his next check-up, his weight has increased slightly. With the increase in his BMI, Paul is slowly but surely drifting towards being obese, and is at risk of early onset of diabetes and high blood pressure.

This hypothetical example easily fits the definition of time-inconsistent behaviour, and readily lends itself to analysis in a planner-doer framework. Paul understands what his health goal is (to lose about 10kg of weight), and the long-term benefits of doing so (preventing chronic ill health, and ensuring his wellbeing into his 40s and beyond). However, he finds himself carrying on in his normal lifestyle and his day-to-day efforts have not given rise to any improvement in his overall weight. How can we explain this apparently irrational behaviour, where Paul does not act in his own best interests? The remainder of

Commitment Devices for Health

this section briefly formalises two propositions arising from the planner-doer model. They draw on the intuition of original model but apply it for the first time to health behaviours for weight loss, to understand Paul's lifestyle choices. Consider his decision-making to be the outcome of a tussle between his two sub-selves, the far-sighted planner sub-self and the myopic doer sub-self.

Proposition 1: A short-Sighted Doer Sub-Self Will Over-Consume, and the Planner will Seek Commitment Strategies

To maximise utility, the doer sub-self will choose to consume as much as possible within a given budget constraint up to some self-limiting satiation point (equation 1), yielding actual consumption of C_D . As shown in Figure 2, this point is reached when the benefits of consumption (satiation, curve S) equal the costs of consumption (curve K). The level may exceed the ideal consumption identified by the planner sub-self, who takes account of current utility but seeks to maximise long run utility (equation 2). The planner's benchmark may be a recommended daily net intake of calories identified by the medical advice (in the previous example, Paul's recommended intake was 2100 to 2700 kcal), which sets an optimal consumption level C_P^* .³

Given the simple utility functions for the planner and doer, actual consumption exceeds the planner's preferred consumption ($C_P^* < C_D$), this implies $V < 0$ and therefore $U_P^* < U_D$. The planner sub-self is unsatisfied with the status quo. Over time, if $C_P^* < C_D$ on a sustained basis, the individual is very likely to have a higher weight than the planner would prefer.⁴

$$U_D = f(C_t) \tag{1}$$

$$U_P = U_D + V \tag{2}$$

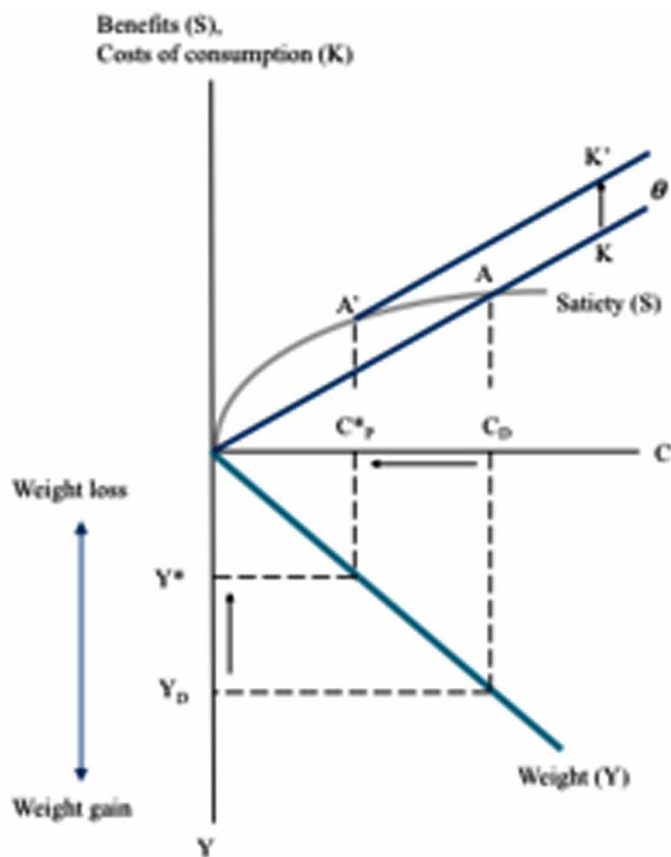
$$V = \sum_{n=t}^T \frac{(C_P^* - C_D^*)}{(1+r)^n} \tag{3}$$

The divergence between the doer's actual consumption C_D and the planner's preferred consumption C_P^* in Figure 2 captures the problem of intra-personal conflict. The planner would then want to change the doer's behaviour and achieve an optimal consumption level that maximises long-term utility U_P . This is what predicts the planner's demand for a commitment device to lock in the doer's actions on a preferred consumption path.

Proposition 2: A commitment Device Acts as a Tax to Curb the Doer's Over-Consumption

Our hypothetical friend Paul wants to lower his weight to Y^* , and understands that this requires a fall in net calorie intake to C_P^* . A commitment device generates some influence on the doer's actions,

Figure 2. How commitment devices shift costs and bring about behaviour change assumes the individual will set consumption at the point where costs (K) and benefits of consumption (satiety, S) are equal. To shift consumption (C), the planner sub-self applies additional tax to consumption (θ), shifting the new points of costs=benefits to a lower level of consumption. This net decrease in energy intake is assumed to translate into weight loss (the shift to Y^*).



which can be represented by a “preference modification parameter” θ (Thaler & Shefrin, 1981, p. 395). This parameter is incorporated in Benabou and Pycia (2002) as a “reduced form representation of more concrete incentives (rewards, punishments) or rules put in place by the planner” (p. 422), but there is little beyond these broad definitions to explain how θ rises and its psychological underpinnings. I contend that θ represents the commitment device as a ‘tax’ applied by the planner on the doer. Such a tax adds further costs to consumption such that the individual now faces curve K' (as shown in Figure 2).

$$K' = K + \theta \tag{4}$$

The new point at which costs and benefits of consumption are equal is lower down the consumption axis, C_P^* , and this moves consumption towards the optimal level desired by the planner. The costs embedded in θ arise from two broad sources: a monetary penalty if the health outcome is not secured, and a “psychological tax” (Miller & Prentice, 2013, p. 303) that affects self-respect, self-esteem or public

Commitment Devices for Health

image. If the individual does not act in a way that is consistent with their goal, the costs of excess consumption increase.⁵ The negative psychological effects – the reputational costs – are what underpin reputational commitment devices. While these may be characterised as “soft” penalties relative to the “hard” penalties of a financial commitment device (Bryan, Karlan, & Nelson, 2010), they nonetheless can change incentives to the point where planner’s and doer’s interests align and positive behaviour change arises (Benabou & Tirole, 2004).

In both cases, θ generates penalties for excess future consumption and in this way can alter the doer’s future choices. Ideally, θ will reduce the doer’s consumption such that it aligns with the planner’s preferred benchmark, so that $C_D = C_P^*$. This behaviour change, in turn, yields the desired health outcome of weight loss towards the target weight (Y^* in Figure 2). The key implication from the model is that a commitment device will exert positive treatment effects on health behaviours and weight loss.

The planner-doer framework is more than mere “metaphor” (Frederick, Loewenstein, & O’Donoghue, 2002). The challenge of making the right health choices in the context of intertemporal trade-offs and behavioural biases have empirical significance (Fan & Jin, 2013; Ruhm, 2012). Many individuals understand the importance of losing weight and achieving a healthy body mass index (BMI), intend to take action to achieve their desired BMI, yet struggle with staying on track with their goal. This is precisely where a commitment strategy is theorised to support behaviour change by going “beyond good intentions” (Rogers, Milkman, John, & Norton, 2015). Theory implies a commitment device will promote behaviour change and health outcomes such as weight loss. The intertemporal shifting of benefits and costs – through a commitment device – helps the planner sub-self to rein in the wayward doer sub-self. The next section considers the practical design features of commitment devices, and how they perform in practice.

A TAXONOMY OF COMMITMENT DEVICES FOR WEIGHT LOSS

A commitment device is a voluntary arrangement that restricts or binds future choices, to “fulfil a plan for future behaviour that would otherwise be difficult owing to intra-personal conflict, stemming from, for example, a lack of self-control” (Bryan et al. 2010, p.671). In reality, commitment devices may take many forms. It may be a written actual contract with a third party (Halpern et al, 2012), or it may be a more ad hoc arrangement created by individuals as a “promise to oneself” (Benabou & Tirole, 2004, p. 849). Whatever form it takes, the commitment device will change the costs of future choices.

Bryan et al (2010) specify two identifying criteria of a commitment device, crucially placing emphasis on the individual’s underlying reason for employing the commitment device:

1. The arrangement is primarily about changing the individual’s own behaviour, where they are the main risk to achieving their plan; and
2. The arrangement does not have a strategic motive in relation to other agents.

These criteria help distinguish commitment devices from other consumer behaviours that involve paying in advance or bulk buying as a means of locking in future choices, but do not have a behaviour change intention. Criterion (i) precludes arrangements made to reduce transaction costs (online shopping), avoid upward price shocks (investing in gold) or reserve a good in high demand (pre-ordering a bestseller); and

straightforward exchanges of goods and services. It also emphasises the centrality of self-control in this discussion of commitment devices, with the *self* being the main source of time inconsistency. Criterion (ii) precludes arrangements that are set up with a strategic motive in relation to other actors, including a variety of institutional, social, legal and political commitments (such as marriage, voting, campaigning, and lobbying behaviour). These criteria also help distinguish between financial commitment devices and more conventional financial incentives for improving health (Charness & Gneezy, 2009).

I identify three broad types of commitment device that meet the two identifying criteria above, and are at present being applied to weight loss behaviours: personal contracts, public pledges, and deposit contracts. These commitment devices are elaborated below.

Table 1. Taxonomy of commitment devices for weight loss

Name	Intensity of Costs From Over-consumption	Nature of Costs	What's at Stake?	Examples
Personal rule or contract to oneself	Low	Reputational	Self-image	New Year's Resolution Using a pre-written groceries list
Public pledge	Medium	Reputational	Public image	Gym pledge board Social media posts
Deposit contract	High	Financial	Money	Penalty-based pledge Placing a bet

Personal Rule or Contract to Oneself (Reputational Commitment)

The softest type of reputational commitment device is a personal rule, which can range from relatively informal rules of thumb and one-off resolutions ('no more chocolate today') to more active practices such as self-monitoring. Self-enforcement relies on there being a cost if the doer reneges on the long-term goal. This cost is theorised to lie in the potential damage to the individual's "self-reputation", so the doer's good behaviour is driven by a fear of setting bad precedents or losing faith in oneself (Benabou & Tirole, 2004, p. 849). A personal rule could be informal (a post-it note reminder on your desk) or formal (a signed agreement to respect the rules of the public library when you join); made out to yourself (a gym workout plan) or with others sharing the same goal (a plan to workout together). A personal rule can also take other written forms (Au, Marsden, Mortimer, & Lorgelly, 2013). A pre-written grocery list can serve as a guide to help the doer sub-self as they are walking around the shopping aisle to stay on track with the planner's dietary regimen. A simple contract signed to oneself is another way of formalising a personal rule, taking a mental note and making it something more tangible (Savani, 2019).

Public Pledge (Reputational Commitment)

A second type of reputational commitment device is a public pledge. Social psychologists define commitment as the "pledging or binding of the individual to behavioural acts" (Kiesler & Sakumura, 1966, p. 349). The commitment makes an act less changeable. The magnitude of the commitment is associated with how publicly it is stated, because of an individual's desire to be consistent with what he has declared

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to others, and to avoid the personal and social disapproval that accompanies inconsistency. Parrott et al believe this lens helps explain “why the use of written and verbal pledges, promises, and contracts has increased compliance with various health care routines” (1998, p. 392), and find that the act of making a public commitment as part of a skin cancer campaign led to more people undertaking prevention and detection behaviours. Similarly, a recent social media study found that people who posted health promotion messages around melanoma awareness were more likely to take sun safety actions themselves in the short term (Nabi, Huskey, Nicholls, Keblusek, & Reed, 2019).

Relative to a personal rule, a public pledge may magnify the reputational costs, as the individual’s behaviour is open to wider scrutiny and disapproval. In the weight loss sector, public pledges are used in various guises. Public weigh-ins at a weight loss group hold the individual to account against their stated target; attendance at an exercise club might be encouraged through a promise to a team; and pledge boards are a common feature at gyms. Further, pledges do not have to be very public to be effective. Recent studies have shown that even brief dialogue or written correspondence with a general practitioner can encourage greater participation in NHS weight loss programmes, linked to a sense of commitment between patient and doctor (Allen, Cohn, & Ahern, 2015; Aveyard et al., 2016). A study of a web-based weight management programme that offered regular nurse support alongside online tools reports qualitative evidence of the nurse being an important external motivator (Bradbury, Dennison, Little, & Yardley, 2015). Making the commitment an external one – even if it is a commitment to just one other person – may inspire a sense of accountability that spurs on behaviour change.

Deposit Contract (Financial Commitment)

Thirdly, a deposit contract is a financial commitment device with a cash payoff that only becomes available on achieving a certain goal. This is subtly distinct from a straightforward financial incentive or gamble. Unlike an external cash incentive, it involves the individual’s own cash. Secondly, it involves setting the money aside, then winning it back, so the net financial gain is zero. This form of commitment device evokes the prediction from Prospect Theory (Kahnemann and Tversky, 1979) that individuals are more averse to losing money than to gaining the same amount. In the planner-doer framework, the deposit contract explicitly redefines the incentive structure the doer faces.

Deposit contracts have been popularised through the website www.stickK.com, which requires that volunteers signing up for commitment contracts pay upfront a sum of money which will be returned to them if they meet their goal, and donated to a charitable (or perceived anti-charity) cause. An observational study of 3,857 voluntary contracts posted to the stickK website over 2013-14 suggests that individuals who staked money on their health goals reported higher weight loss than those with no monetary stake (Lesser, Thompson, & Luft, 2018). The difference was more pronounced when the money was pledged to an anti-charity, meaning a cause that the individual does not personally agree with. Individuals who pledged their money to a charity or a friend also lost weight more successfully than those with no deposit. The evidence draws a clear correlation between the financial deposit and subsequent weight outcomes, with 37% of the anti-charity group achieving their weight loss goals relative to 5% of the group who did not stake any money at all. However, the study cannot claim causal inference between the commitment device and health outcomes, due to confounding variables such as motivation and knowledge. Without a randomised assignment, it is not clear that the commitment device brings about the change, or whether those who sign up for the deposit contract are simply more motivated and able from the outset to achieve behaviour change.

Deposit contracts were also used to promote weight loss in a scheme piloted by the NHS (Relton, Strong, & Li, 2011). Schwartz et al (2014) and Mochon et al (2017) test the impact of a penalty-based commitment device to improve the share of healthy food items in grocery shopping, through a field experiment run in collaboration with a South African private health insurance firm. Conventional gambling also falls into the category of a deposit contract. Burger and Lynham reviewed bets placed with a betting agency, and found 51 that related to personal weight loss outcomes. They report that 20% of these bets were successful. Their paper reports that 70% of participants they corresponded with viewed the bet as a commitment device (Burger & Lynham, 2010, p. 1163).

A potential fourth category arises in paying a voluntary premium, for a product or service that is expected to help them reach their goal, such as joining a professional weight loss club or private gym. These actions could be interpreted as a form of financial commitment; if the payment is viewed as an investment towards their behaviour change goal, with a strategic objective of changing future health behaviours. The activities involved in these clubs are often not based on proprietary technology or a unique method. Yet individuals are willing to incur out of pocket costs for what are perceived as premium products that facilitate weight loss, despite there being free or cheaper alternatives. Premium payments have been implicitly interpreted as commitment devices in the wider literature. DellaVigna and Malmendier (2006) ascribe a behaviour change motive to gym membership, and examine whether the upfront gym membership plans lead to increased gym usage. Tarozzi et al (2009) study the effects of malaria bednet retreatment amongst poor households who choose between different purchasing options. The option to pay in advance for a bednet to be retreated, to ensure stronger anti-malaria protection, is described as a contract that “financially ‘commits’ the person who chooses it to comply with future retreatments” (2009, p.232). These studies examine commitment devices that involve money being staked on an outcome, but do not promise a monetary payoff. A challenge to this interpretation is that the money is no longer at stake, so it does not qualify as a strategic interaction. Savani (2018) suggests the upfront payment may be better understood as a reflection of initial motivation rather than a sophisticated attempt to shift intertemporal costs and enable behaviour change, and is not included in the taxonomy as a comparable commitment device.

This section has presented three main types of commitment device for weight loss, which rely on self-image, public image, or monetary stakes. Using these principles, real world commitment devices can take diverse forms, and suggest the potential to be easily embedded into public services aimed at supporting behaviour change and healthy weight outcomes. Some empirical evidence suggests positive effects on exercise and weight, confirming predictions from theory. However the evidence base has considerable room for improvement. There is a need for more studies, particularly of reputational commitment devices, and for more robust research designs.

A recent systematic review identified ten studies that include a ‘soft commitment’, defined as a verbal or written commitment to a health behaviour and/or outcome that is witnessed by at least one other person (Coupe, Peters, Rhodes, & Cotterill, 2019, p. 2). This definition fits best with the second type identified in the taxonomy above – a reputational commitment device that relies on costs to public image to influence the doer sub-self’s behaviour. The review concludes that commitment devices have the potential to change behaviour, but highlights the lack of high quality and comparable evidence. The reporting of trial procedures around blinding, allocation concealment and randomisation was often poor in older studies, and the overall risk of bias was ‘unclear’ in several cases. Only three studies were included in a meta-analysis. Various limitations in reporting and sample size mean the estimated positive mean weight loss from commitment devices has to be interpreted with caution; the authors ultimately

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conclude that “confidence intervals are wide and don’t rule out the possibility of minimal or zero effect in the longer term” (Coupe et al., 2019, p. 10).

Empirical tests of commitment devices tend to be highly varied and often combined with other health promotion features, and these are both barriers to drawing robust conclusions about how well they work in practice. One of the studies included in Coupe et al.’s review finds that the group using an app to make and track health pledges reports more successful weight loss than a control group (Balk-Møller, Poulsen, & Larsen, 2017). However this study intervention relies on pledges and group commitment as well as team competition and rewards that are based on a lottery system, so does not fully isolate the reputational commitment element from the prize incentive (albeit not a cash incentive). Another recent study involves health ‘coaches’ to provide tailored advice and information to improve physical activity at home, in order to support weight loss (Kegler et al., 2016). Results are reasonably promising, with the treatment group reporting a higher decrease in net energy intake, and a higher probability of not gaining weight, but no difference in physical activity. Here, too, the study involves a behavioural contract amongst other intervention design features including informational materials and home visits to analyse the environmental issues, so is arguably a broader intervention than just the commitment contract.

The diversity of study designs and commitment device interventions arguably enriches the emerging evidence base rich; but it also makes it harder for policy makers to identify when and how exactly commitment devices could be brought to bear in public health and weight management programmes. It is this question we turn to next, drawing on research that isolates the effects of reputational commitments, in a digital health setting (Savani, 2018). Using this study, the unknowns of reputational commitment devices are distilled and linked to a future agenda for research and evaluation.

FRAMING A RESEARCH AND POLICY LEARNING AGENDA

Insights From a Study of Online Reputational Commitment

Savani (2018) reports a field experiment (n=364) that tested two commitment devices with users of an online weight management service in the UK. Users paid an average £5 monthly subscription, for access to an online (and app-based) calorie counter tool, a food journal, online discussion forums, healthy eating advice, and a self-reported weight tracker against their personal target. After completing a baseline survey, participants were randomly allocated to one of three experimental groups. The comparison group continued with the service as usual, paying the monthly fee. Another group were offered a refund of one month’s subscription fee. This intervention provided an opportunity to test whether the monthly fee serves as a financial commitment device, although there is no money at stake. For full details on the study design and results see Savani (2018). The discussion below focuses on the experimental group that were offered a reputational commitment device.

Users in this group paid their monthly fee and in addition were asked to nominate a ‘coach’, a friend or family member who was aware of and supported their weight management goals, and who could be contacted at the end of a four-week period to verify weight loss progress. The intervention was in line with existing research on ‘supportive accountability’, where a trusted coach can improve adherence to behaviour change goals in the context of e-health interventions (Mohr, Cuijpers, & Lehman, 2011). Naming a coach was an additional element of reputational commitment to their weight loss goals. Making a weight loss goal known to another person created a ‘psychological tax’ to renegeing on that goal.

Theory suggests the planner sub-self locks in ‘good’ behaviours such as self-monitoring, improved diet and physical activity, that the doer sub-self might otherwise abandon. The experiment was therefore able to frame a hypothesis that a reputational commitment device would promote weight loss; specifically that the ‘coach’ group would report higher weight loss than the comparison group.

Of those asked, 41% nominated a coach, highlighting that reputational commitment devices lack universal appeal; although the 41% compliance rate with this treatment compares favourably with other studies that report lower take-up of commitment devices offered (Gine et al., 2010). Overweight participants, women, and those with more short-termist health attitudes were more likely to nominate a coach. Younger participants were less likely to nominate a coach, as were those reporting higher baseline exercise levels. Non-compliers were asked why they turned down the intervention. The top three reasons were not wanting to share the coach’s details (30% of respondents), not wanting to share their goal with anyone else (29%), and not being able to think of a coach to name (24%). It is perhaps telling that more than half of participants felt it was either too personal to share or could not immediately identify a person who might act as a coach.

A key contribution of this study is the unexpected result from the ‘coach’ treatment. At 12 weeks, all experimental groups registered some weight loss on average. The comparison group reported 2.2% average weight loss. The coach group reported an average of 1.1% weight loss, with regression analysis finding the average treatment effect from being offered a coach (intent-to-treat) were weight outcomes 1.5 kg higher than the comparison group ($p=0.032$, effect size -0.32). The results refuted the hypothesis that the reputational commitment device would promote weight loss. The weak treatment effect could have been a result of weak treatment intensity due to low nomination rates for the coach. Savani (2018) rules out this explanation by reporting that those who nominated the coach recorded an end weight 4.4 kg higher ($p=0.028$). In other words, compliers fared worse than those who were offered the treatment but declined.

One implication from this finding is that reputational commitment devices are not a ready-made solution to uneven motivation. There will be occasions and individuals for whom commitment devices work well; but they should not be expected to work in all circumstances. As one of few studies testing reputational commitment devices in an online setting, the negative results present a number of insights for researchers and policy makers, which are discussed next.

Commitment Overload and Wellbeing

Participants may have experienced some form of ‘commitment overload’, as a result of adding elements of commitment to the weight loss goals. The concept of overload implies a threshold exists beyond which more commitment can have adverse effects. This concept is not found in the commitment devices literature, but the wider literature offers some support. Verhoeven et al (2013) suggest the potential negative effects from an overload of planning in a study where multiple plans to curb unhealthy snacking were less effective than a single plan with the same objective. In a follow up study, the authors suggest that neither initial motivation nor the act of making multiple plans explained the lack of effect on health behaviour change, but the process of trying to implement multiple action plans became problematic.

For health programme providers, the findings represent a cautionary tale on giving users too much commitment. The heterogeneity in preferences for naming a coach demonstrate the value in allowing users to set their own level of commitment, on the assumption that individuals know what their own thresholds are. However, it is not clear that individuals are “sophisticated” (O’ Donoghue & Rabin, 1999), in the

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sense of being able to predict their own behavioural responses or identify an optimal level of commitment. This presents a challenge for policy makers, but is one that could be addressed in medium-term programmes that allow for regular reflection, learning, and adaptation of commitment strategies.

There is a clear gap in scholarly discussions around threshold effects on commitment and health behaviour effects. What happens when we cross the threshold? How do commitment devices interact with wellbeing to create either a positive spiral of progress, or a negative spiral of demotivation? Is overall wellbeing during the pursuit of health goals and behaviours linked to the propensity of experience commitment overload? The welfare effects of commitment devices are under-studied, and theory gives no clear indication of the impacts (Bryan et al., 2010, pp. 679, 693). The empirical evidence here raises the importance of wellbeing and commitment for future research.

Commitment and Moral License

Another potential downside of commitment devices may arise in the form of moral licensing effects, where “acting in one direction enables actors to later do just the opposite” (Mullen & Monin, 2016, p. 364). Spending time and energy on the ‘good’ health behaviours, and increasing the salience of costly personal efforts to pursue these behaviours, might engender a sense of having ‘earned’ the opportunity for other, less helpful, behaviours. Overall, these countervailing behaviours could reduce the effect of the commitment device on health outcomes.

Such licensing effects have been associated with energy consumption behaviours, with a recent study finding that households in the US that successfully reduced water consumption also reported higher electricity consumption than the comparison group (Tiefenbeck, Staake, Roth, & Sachs, 2013). Moral licensing has been identified in dietary choices too. Chang and Chiou find that “using weight-loss supplements may increase perceived progress toward weight reduction but decrease dietary self-regulation”, generating a liberating effect that could be counter-productive for health outcomes overall (Chang & Chiou, 2014, p. 8). These results suggest the interaction of commitment strategies and moral license effects deserves further research inquiry. The interplay between positive influences from a commitment device and negative influences from moral licensing might help explain why the evidence base as a whole reports mild to zero average effects from reputational commitment devices.

Moral license effects raise challenges for policy makers. Specifically, the question of how to maintain behaviour change in the event of strong, early progress from using commitment devices. While self-monitoring has been widely accepted as an essential part of weight loss programmes (Butryn, Phelan, Hill, & Wing, 2007), there is evidently potential for complacency if participants know they are doing well. Health programmes could build in ways to sustain conscientious behaviour, by making individuals aware of the risk of giving themselves licence.

Commitment Devices in Digital Health Interventions

Early studies of commitment devices for weight loss tested their effectiveness in contexts involving face-to-face interaction with peers and health professionals; for example, in gyms and health centres (Nyer & Dellande, 2010) or medical settings (Volpp et al., 2008). As noted earlier, the context for weight management aids is evolving, characterised by the growing use of digital health tools to support lifestyle change; and the Covid-19 pandemic raises the likelihood that people will by necessity use online interventions to support their weight loss endeavours. We are likely to see increased demand for online commitment

strategies and ways to combine them with offline behaviour. But there are good reasons to be cautious about the interaction of online and offline interventions. Offline commitment devices do not guarantee adherence to online interventions: the coach group were no more likely to use self-monitoring tools than other participants during the experiment (Savani, 2018, p. 15).

There is mixed evidence of the combination of human and online commitment strategies. Mohr et al (2011) suggest that “the effectiveness of and adherence to eHealth interventions is enhanced by human support”. In contrast, Savani (2018) indicates the reputational commitment group lagged behind the comparison group. These findings support the idea that an over-reliance on human support in a web-based weight management trial can cause a drop in motivation once the support ended, leading to a considerable decline in final weight management despite strong performance early on (Bradbury et al., 2015, p. 49).

CONCLUSION

Commitment devices are increasingly being incorporated into preventative health activities to promote behaviour change and health outcomes such as smoking cessation and weight loss. Their potential role in addressing time inconsistency, and encouraging sustained adherence to positive health behaviours, is formalised in a novel theoretical framework presented in this chapter, drawing on Thaler and Shefrin’s (1981) planner-doer model. It explains how commitment devices can bring about health behaviour change and sheds light on the internal tussle between planner and doer sub-selves. In this way, the framework has added depth and “psychological texture” (Thaler, 2016, p. 1592) to existing empirical research which have reported success from commitment devices.

The taxonomy of different types of commitment devices for weight management presented above highlights the range of forms that commitment devices might take, and the varying intensity and nature of costs arising from different designs. A key distinction is between those that rely on reputational costs and those that have monetary stakes. The available evidence indicates positive effects from both financial and reputational commitment devices on weight loss, although there are limitations to this body of evidence. Savani (2018) contributes to the empirical literature through a dual test of a reputational commitment devices in a digital health setting. Findings contrast with those implied by planner-doer theory, and with the findings of other studies (Inauen et al., 2014; Nyer & Dellande, 2010; Prestwich et al., 2012); and raise new questions around commitment ‘overload’ and moral license effects, which are currently under-theorised.

Future research could usefully frame new questions around threshold effects and the optimal level of commitment that motivates action; the causal mechanisms potentially underpinning commitment overload; and other ways to encourage commitment to weight loss goals that are being pursued through digital health interventions. Qualitative evidence may deepen our understanding of moral license effects and the lived experiences of those who take up reputational commitment devices. Research is also turning to smart and wearable health trackers, which make self-monitoring easier and arguably fit into the commitment device analytical framework by allowing the planner sub-self to identify in real time where the doer sub-self is going off track. While we might expect that commitment devices are required to encourage individuals to keep using such digital health tools, Nelson et al (2016) suggest the use of wristbands might also have a positive effect on commitment to goals. The interplay between commitment device designs and evolving digital health tools is clearly a promising area for further investigation.

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The Covid-19 pandemic presents arguably the most pressing reason for more research into behavioural policy solutions for weight management and other health-seeking behaviours. The associations between obesity, diabetes, and the severity of Covid-19 are still being understood, but preventative health behaviours may well provide an important defence against the worst effects of the virus. Meanwhile, behavioural insights are being incorporated into public health guidance (ref). Commitment devices may come to be seen as an appropriate tool for supporting health behaviours in the wider effort to contain the pandemic; which begs the question, what could policy makers learn from the available evidence and how might commitment devices be deployed for public health gains?

Commitment devices are potentially useful tools for policy makers. But the relatively modest results reported in this chapter imply they should not be used as stand-alone measures, or viewed as self-contained solutions. Commitment devices can work, but are unlikely to deliverable sizeable health effects by themselves. In this regard, it is an advantage that they can be designed in a variety of forms, with different forms, and varying levels of intensity. Commitment devices are flexible enough to be incorporated into existing health services and programmes, both online and in-person. Reputational commitment devices in particular can be cheaply administered, and are more straightforward in terms of ethical issues and fiduciary management than financial commitment devices; however, they may not appeal to everyone, and could give rise to unintended effects such as overload or moral license. The wider evidence demonstrates they can be used alongside and incorporating human support, and channeling commitment to health practitioners such as GPs and nurses has been shown to have positive effects. Testing amongst the specific target population is key to ensuring a good understanding of acceptability, spillover effects, and unintended consequences, which might then allow for commitment devices to be reliably scaled up in public health programmes.

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ENDNOTES

- ¹ These examples demonstrate that commitment devices represent a range of different mental strategies, not physical or digital devices as such. The paper uses the terms commitment device as defined by Bryan et al (2010), interchangeably with the concept of pre-commitment strategy as originally coined by Strotz (1955).
- ² see Ruhm 2012; Fudenberg and Levine 2006; and Gul and Pesendorfer 2001 for a discussion on related dual-self and dual-system theories.
- ³ <https://www.nhs.uk/Livewell/Goodfood/Pages/eat-less.aspx> (accessed Aug 7 2019)
- ⁴ Ruhm (2012) demonstrates through an alternative dual-system formalisation that food consumption would exceed the optimal level due to the potential for self-control problems in such a decision-making context, compared with a simpler case where the planner sub-self faces no resistance from the doer’s actions. Empirical evidence supports this prediction, with data from the US nutrition and health survey suggesting that overweight and obese people are more likely to prefer to weigh less than they actually do (Ruhm, 2012, p. 789).
- ⁵ Bryan et al (2010) use the dichotomy of ‘hard’ versus ‘soft’ commitment devices to draw a distinction between those that stake money and those that rely on psychological costs to generate behaviour change.