

CALL FOR EVIDENCE: BEHAVIOUR CHANGE

PREPARED FOR THE HOUSE OF LORDS SCIENCE
AND TECHNOLOGY COMMITTEE

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1. OVERVIEW

Understanding the causes and consequences of human behavior is at the heart of all social science disciplines. In this review, our analysis brings together economic frameworks for understand behavioral change, psychology based models, and insights from public health, neuroscience and sociology. Many of these disciplines provide overlapping or complementary insights on the drivers of behavior and potential policy instruments to change behavior.

For example behavioral economics uses insights from psychology as basis for its modeling assumptions, and then the standard tools of economic analysis to make predictions on behavior. Given this overlap, we will emphasize the common drivers of behavioral change that these disciplines suggest, rather than suggesting that one approach is inherently preferable to another.² We will also review the evidence from these research fields. Throughout we emphasize that data generated by field experiments provide a gold standard for evidence based policy, ensuring policies are both effective and cost-efficient.

Individual behaviour can be understood as deriving from two factors. First there are factors that are **internal** to the individual. Examples include the individual's preferences, beliefs, expectations, personality, and so forth. Second, there are factors **external** to the individual but that shape the environment in which individual decision making takes place. Examples include social norms and economic conditions they face.

Understanding whether and how individual behaviors can be affected essentially boils down to appreciating **whether and how** these internal and external factors can first be altered by policy, and second, how they impact on decision making in the short run and in the long run. Academic disciplines differ in the extent to which they recognize and emphasize different types of internal and external factor.

In Section 2, we begin by highlighting the different theoretical and evidence based insights of different disciplines. We provide a brief review of alternative approaches across the disciples of economics, psychology, neuroscience and sociology. Here we begin to address **Question 1** in the call for evidence.

In Section 3 we describe in more detail the range of **internal** factors for which robust evidence has been found suggesting they influence individual decision making. Policies can

² This multi-disciplinary view of research that brings together academics from different fields is a core principle behind the ELSE Research center at UCL. We return to this in our discussion of reseach capacity in the UK in Section 7.

shape individual behaviors through the following types of internal factor: self-efficacy; emotion; ego; altruism, fairness and equity; probabilistic judgments; salience and framing; time preferences; reference points; loss-aversion; bounded rationality; mental accounts; choice from lists; information; scarcity. Each of these is thought to be an internal driver of behavior. For each we describe the evidence related to interventions that attempt to manipulate these factors to change behavior.

Later in Section 3 we focus on specific internal drivers of **addictive behaviors**, as requested in the call for evidence. More precisely, we review the evidence related to addiction and self-control; habits; temptation and willpower. In summary, in Section 3 we further address **Questions 1 and 2** in the call for evidence. Given the focus on addictive behaviors, the literature across academic disciplines on drivers of addictive behavior is summarized in the Appendix.

In Section 4 we review various forms of **external** factor driving behavior change, as emphasized in the social psychology, public health and sociology literatures. Through such factors, policies can try and shape community wide behaviors. The external factors we discuss are: norms; public commitments; reciprocity; regulations; persuasion; and contextual factors. This section completes our discussion of **Questions 1 and 2** in the call for evidence.³

In Section 5 we cover issues related to **policy design**. We reiterate that behaviour change **interventions** attempt to shift individual behaviour through changes in the internal and external factors that drive decision making. We then discuss how different interventions can be layered on top of each other if they are complementary. We provide real world examples of such layered behavioral change policies. In doing so we address **Questions 5, 6 and 7** in the call for evidence.

In Section 6 we discuss further issues relating to **ethical** concerns of behavioral change policies, **equity** concerns, **policy evaluation** and **public engagement**. We again re-iterate the need for credible evidence based policy, where the gold standard is provided by carefully crafted field experiments. Hence in this section we address **Questions 13 and 14** in the call for evidence.

In Section 7 we complete our discussion of some practical considerations related to behavioral change policies. This focuses on whether the UK has the **research capability** to support the levels of interventions being considered and implemented, and existing

³ Although the call for evidence explicitly suggests consideration of measures apart from regulation and prohibition of choice, we find it useful to compare the evidence in support of such policies with that for other external factors driving behavior.

mechanisms linking local and national government to academics and others that can offer advice on how to design, implement and evaluate behavioral change. We also discuss the ability of government and academic to engage the public in discussion of behavioral change policies. In doing so we address **Questions 3, 4, 10, 11 and 12** in the call for evidence.

In Section 8 we review the findings of some **well known behavioral change interventions** from a number of countries. These interventions cover a variety of policy spheres such social behavior, community participation, the environment and health. Some of these interventions have been conducted by policy makers, and others have been instigated by the voluntary sector. Here we address **Questions 8, 9 and 15** in the call for evidence.

In the final section, Section 9, we address questions regarding the case study of **tackling obesity**. We discuss the evidence that attempts to identify the contributing factors of obesity in order to find potential points of interventions. We focus on those interventions that have been evaluated through controlled experiments. In the Appendix, we provide a detailed table highlighting all the studies on behavioral change in obesity. Here we address **Question 16** in the call for evidence.

From the outset it is worth highlighting the common themes throughout all the sections. First, it is our aim to highlight that the insights on the determinants of behavioral change from different academic disciplines of economics, psychology, neuroscience and sociology are **complementary** to each other, not competing ideas. All of them can be framed within the structure of there being internal and external drivers of behavior. All of these are potential levers through which policy instruments can operate.

The second common theme is that there is a strong need to build a credible evidence base for behavioral change interventions. The most credible evidence relies on **randomized experimental variation** being induced so that some subjects are randomly assigned to receive some policy treatment, and others are randomly assigned to a control group without any treatment. The comparison of these otherwise similar subjects can be credibly argued to measure the **causal impact** of the policy intervention. The experimental variation induced can be either in a laboratory environment, as is often the case with research in psychology and neuroscience, or from **field experiments**, that is increasingly being used in economics and public health.

The essence of the field experiment research method involves researchers engineering carefully crafted exogenous variation into real world economic environments, with the ultimate aim of identifying causal relationships and mechanisms underlying them. A detailed discussion of the methodology of field experiments can be found in List and Rasul

[2010]. Field experiments based on real world data differ from laboratory experiments in that they provide data from an environment in which subjects naturally undertake behaviors and where the subjects do not know that they are participants in an experiment. Therefore, they neither know that they are being randomized into treatment nor that their behavior is subsequently scrutinized. Such an exercise is important in that it represents an approach that combines the most attractive elements of the laboratory and naturally-occurring data: randomization and realism. In addition, it is difficult for people to respond to treatments they do not necessarily know are unusual, and of course they cannot excuse themselves from being treated. Hence, many of the limitations cited in laboratory studies - such as the ability of subjects to choose not to participate - are not an issue when making inference from data generated by natural field experiments.

A third theme is that the **voluntary and private sectors** have long established methods of inducing behavioral change among consumers. For example, there is a vast economics and psychology literature on how charitable organizations try to induce individuals to donate to their cause. Often they exploit various internal and external factors that we discuss, such as making social comparisons, or appealing to an individual's ego or sense of fairness. Private sector firms have long used various marketing ploys to exploit salience, inconsistent time preferences, default choices and so forth. There is potentially much policy makers can learn about inducing behavioral change, especially of individuals rather than communities, from this literature.

Finally, as noted in the original call for evidence, we have explicitly avoided replicating the discussion in previously commissioned government reports on behavioral change, such as MINDSPACE and other reports from the Cabinet Office. We have instead focused on our comparative advantage which is to give a sense of the existing credible evidence from a range of disciplines of whether and how policy interventions can leverage against internal and external factors to induce behavioral change. Section 3 focuses on factors that induce change among individuals, Section 4 focuses on community wide behavioral changes. Throughout we try to make clear the implications from evidence for being able to induce changes only in the short run, or whether long run and sustained change can be achieved.

While we mostly provide a brief summary of research findings in the main text, the footnotes provide more detail on each study. The appendices also provide more detailed overviews of the evidence related to addictive behaviors and obesity. We hope the committee finds our review of the evidence of use, and would be happy to provide further detail as required.

2. UNDERSTANDING BEHAVIOUR

1. What is known about how behaviour can be influenced?

Economic Approaches to Behavioral Change

The **neoclassical** economic model of individual decision making emphasizes individual choices are rational in that they are: (i) always made in the individual's self-interest; (ii) based on an assessment of the expected personal costs and benefits of any action over other possible actions.⁴ In short, individuals seek to maximize their utility subject to the constraints they face. Such constraints might include budget constraints embodying information on the prices an individual faces and the income they have, as well as regulatory constraints arising from policy interventions.

In the neoclassical framework, markets will exist, or firms will have incentives to establish them, that allow individuals to make rational choices and maximize their utility. Government intervention is then justifiable wherever an individual's rational choice might be hindered by some market that fails to form, or some kind of market failure, such as imperfect or asymmetric information, externalities, or imperfect public goods provision.

The neoclassical model generates a rich set of insights and policy implications on how individual decision making is affected by changes in the constraints they face, and there are many decades of microeconomic research that support the basic predictions of this framework. For example a vast body of evidence confirms the predictions of neoclassical economic models in terms of how individuals respond to changes in price and income, the information they have, and the uncertainty they face.

While the original formulation of the model emphasized behavior being driven by both internal factors – as embodied in the individual's utility function – the model also allows for external factors such as prices. A recent wave of literature has also extended the neoclassical model to incorporate further external factors driving decision making such as concerns for fairness, altruism, group norms and peer influences. Many of these factors are discussed in more detail in Sections 3 and 4 below.

⁴ Utility theory is derived from axioms of preference that provide criteria for the rationality of choice. As discussed in Rabin (2002), in the neoclassical model individuals are assumed to be rational in that their preferences are ordered, known, invariant and consistent. Individuals maximize their expected utility, are Bayesian information processors, have well-defined and stable preferences, exponentially discount future well-being, are self-interested, have preferences over final outcomes not changes or process, and have only instrumental tastes for beliefs and information.

However, the framework has been criticized both by economists and psychologists. These concerns stem from the neoclassical model failing to take full account of internal factors determining decisions that often relate to individual psychologies. This has led to a burgeoning literature on **behavioral economics** that has integrated psychological understanding of decision-making into an economic framework. Hence internal factors such as habits or addictions, emotional responses and rules of thumb can be incorporated in research on individual decision-making.⁵ These factors are each discussed in turn in the next section along with the associated evidence that such internal factors do seem to be important drivers of behavior.

A key implication of behavioral economics is that traditional policies that assume rational behaviour and therefore emphasize the importance of financial incentives or the provision of information, may be less effective. Instead, behavioral economics emphasizes policy-makers should also use tools that influence the internal factors relating to psychology, that drive decision making. These include changing the salience of different elements of choices, the importance of framing choices in one way or another, setting default options and emotive associations. Many of these are often referred to in policy debates as ‘nudges’.

A third relevant strand of the economics literature is based on **neuro-economics**. This integrates methods from **neuroscience**, psychology and economics to study individual decision making. This reinforces and builds on the behavioral economics approach to add observations of the nervous system to the set of internal factors that drive decision making. For example, by examining the brain, processes associated with the perception of actions and choices can be analyzed. This helps provide a neurological foundation for some internal factors driving behavior, such as framing effects, that are emphasized in behavioral economics.

An important policy insight generated by this branch of research is to better understand the effects of rewards and punishments on behavior⁶. Related to this, is conditionality, where a reward or punishment is contingent on behaviour change, can be another tool for policy makers. Conditionality has been discussed in UK policy circles in terms of a contract

⁵ M. Rabin. (2002).

⁶ D.J.F.de Quervain, U. Fischbacher, V. Treyer, M. Schellhammer, U. Schnyder, A. Buck and E. Fehr. (2004) explore activations when agents decide to punish. In their experiment, players A and B are each endowed with ten “money units.” Player A can either keep his endowment of ten or send it to player B; money sent to player B is quadrupled by the experimenter, if A sends ten, then B has fifty. Next, B has the choice of sending back either nothing or half of the fifty. Finally, A has the option of “punishing” B by assigning up to twenty “punishment points”; the cost to A and B of this punishment varies over treatments. In condition IC, punishment is costly to player A and costly to player B; in condition IF, punishment is free for player A and costly to B. There were eleven subjects who punished maximally in IF. For these subjects, differences in activation levels cannot be due to the chosen punishment, so it is natural to interpret them as a sign of the “reward” to punishing.

– an agreement on fixed terms. The individual receives a benefit, for example in the form of a right of access to a public service. In return, some kind of responsibility may apply⁷.

Psychological Approaches to Behavioral Change

Psychologists explore the basic drives and motives of behaviour, social influences and emotions. **Cognitive psychology** in particular examines how people reason, formulate judgments and make decisions. The main basis of behavioral psychology is that all behaviors are learned. Learning can occur through associations (**conditioning**) or through rewards and punishments (**operant conditioning**). This approach emphasizes that factors such as timing, context, cues, internal states and recent events impact how quickly a behaviour is acquired, the strength of the response, the probability of relapse and the maintenance of a newly acquired behaviour⁸.

This literature has wide implications in terms of how behavioral change might diffuse through a population. It also sheds light on how longer run changes in behavior can be induced and made self-reinforcing.

Social psychology places more emphasis on external factors driving decision making such as how individuals think about and relate to one another. Social psychologists typically explain behaviors as a result of the interaction of individual and **interpersonal factors**, where the latter consist of cultural norms, social influence, and group dynamics⁹. A key policy implication is that the behavior of many individuals can be altered by manipulating these interpersonal factors, or perhaps targeting change first among focal individuals within a community. The latter strategy is well recognized among marketers.

Sociological Approaches to Behavioral Change

Sociology is a community level approach to understanding behaviour. It highlights the importance of an individual's wider social context by examining interactions and exchanges at the micro-level and group dynamics, group development and crowds at a macro level. The role for government is to promote and ensure equal access to facilitating conditions.

⁷ D. Halpern, C. Bates, G. Beales, and A. Heathfield. (2004).

⁸ M. Bouton (2000).

⁹ E. Smith and D.M. Mackie (2000).

3. POINTS OF INTERVENTION AT AN INDIVIDUAL LEVEL

1. What is known about how behaviour can be influenced? What special considerations apply to addictive behaviour?
 2. What are the policy implications of recent developments in research on behaviour change?
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We now describe in more detail the range of **internal factors** for which robust evidence has been found suggesting they influence individual decision making. We focus on evidence provided by the broad economics and psychology literatures described above. Later in this section we focus on issues specifically related to addictive behaviors, habits, temptation and willpower. In the next section we turn to review the evidence on external factors driving decision making.

Self-Efficacy and Agency

Self-efficacy is a person's perception of his or her own ability to succeed in reaching a goal. It determines the initial choices made, and how much effort is exerted to make and implement these choices over time.

There are several ways to increase self-efficacy. First, setting **small incremental goals** can give the impression of success and help persistence. Second, self-monitoring, feedback and motivating rewards can reduce anxiety about one's ability to achieve a behavior change, thus increasing self-efficacy. **Feedback** can also help individuals learn about the returns to their effort, and which types of effort to exert to achieve any given goal. For example, cholesterol monitoring gives at-risk patients several useful forms of feedback: they can determine a target, measure process and seek advice¹⁰. Third, interventions through access to skills, resources and training can enhance individuals' perceptions of self-efficacy¹¹.

Finally simply dictating the appropriate conduct reduces self-efficacy and is likely to encounter resistance. As discussed below in relation to informational policy interventions, in many circumstances the barrier to change is not that individuals lack information or are unaware of the consequences of their actions.

¹⁰ D. Halpern, C. Bates, G. Beales, and A. Heathfield. (2004).

¹¹ C. Wilson and H. Dowlatabadi (2007).

Agency is a person's belief that they can "make a difference" with their action. In the past, unsuccessful climate change interventions have been blamed on their lack of agency. From an individual's point of view, the problem of climate change might be perceived to be too large for a single individual's action to have a lasting impact.

Like self-efficacy, agency is not something policy makers need to view as unchangeable. For example, agency might be accumulated through personal experience or through working in groups of like-minded individuals. Hence promoting agency might be important for policy intervention related to climate change, for example.

For use both of these internal factors to change behavior, it is therefore important to encourage the active participation of the public. This can bring individuals in contact with others of similar beliefs, and help individuals to feel engaged with the policy and that they can make a difference. This helps change behavior and ensure behaviors remain changed in the longer term. On this point, research on Swiss cantons has measured the impact of referenda for making major decisions. It was found that this participatory approach not only improved policies but increased the well-being of citizens¹².

Emotion

Emotions can directly influence our judgment¹³. Fear is an obvious example of an emotion that can take control of our action. People in a good mood tend to make unrealistically optimistic judgments, while people in a bad mood tend to be pessimistic. Playing with the emotions of the public is controversial as there can be unintended negative effects. Creating fear without a clear connection to a change in behaviour can lead to people continuing with their same actions but with increased anxiety.

Many social marketing campaigns have used the power of emotion. Emphasizing one particularly salient or emotional attribute may influence a decision more than providing information on all attributes. Selling comfort and fulfilled desires can motivate homeowners to renovate their home better than the prospect of energy efficiency¹⁴. Drink-driving and seatbelt awareness have been successful interventions appealing to our emotions. When dealing with emotions, choosing the appropriate person can be crucial. Bringing offenders and victims face-to-face can produce strong emotional reactions such as guilt or anger. Some claim this system empowers victims and can reduce crime.

¹² B. Frey and A. Stutzer (2002).

¹³ M.L. Finucane, A. Alhakami, P. Slovic, S.M. Johnson. (2000).

¹⁴ R.L. Knight, L. Lutzenhiser, S. Lutzenhiser. (2006).

Ego

We tend to act in a way that makes us feel better about ourselves. Violent crimes are often related to low self-esteem and struggle for respect¹⁵. Self-image campaigns can be a powerful tools. Anti-smoking campaigns have used this technique by showing how our physical appearance can deteriorate with smoking.

Altruism, Fairness and Equity

Altruism is a positive concern for others as well as yourself. Altruism can be either “general” (caring about everyone) or “targeted” (caring family and friends). Most often, the more a sacrifice helps somebody the more likely you are to be willing to make this sacrifice¹⁶. Recent evidence from psychology and economics suggests individuals care, or derive utility from, fairness and equity concerns on how resources are distributed, not only their own personal well-being¹⁷. Evidence also suggests individuals care about intentions and motives and often **reciprocate** the good or bad behaviour of others. The use of reciprocity in policy interventions to induce behavioral change is discussed further in the next Section on external factors.

Charitable giving towards the voluntary sector has been much analyzed in order to determine the underlying motivation. Two types of motivation can be distinguished: individuals like to give, for example because they have altruistic preferences or because of the warm glow they receive from giving, but that individuals would rather not give but dislike saying no, e.g., due to social pressure. These findings suggest that social pressure is an important determinant of door-to-door giving. Charities understand that these internal drivers of behavior can be manipulated, and many fundraising campaigns attempt to use these to increase giving behavior.

A study of particular note is S. DellaVigna, J.A. List and U. Malmendier (2009). They present evidence from a **field experiment** in which they design a door-to-door fund-raising drive. In the experimental design some households are informed about the exact time of solicitation with a flyer on their door-knobs. Hence they can seek or avoid the fund-raiser. Findings suggest that the flyer reduces the share of households opening the door by 10 to

¹⁵ J.S. Walkera and J.A. Bright (2009) review studies from the last 20 years evaluating the relationship between self-esteem and violence. A theoretical model is subsequently presented in an attempt to integrate ideas about self-esteem, 'machismo', and violence. It is proposed that important cognitions relating to violence also relate to self-esteem and the (arrogant or aggressive) protection of low self-esteem in the face of humiliation.

¹⁶ M. Rabin. (2002) develops a framework in which this is predicted by simple altruistic preferences that assume people weight others' utility positively in their own utility function. In this sense, assuming simple altruism provides insight into departures from self-interest.

¹⁷ B.S. Frey, M. Benz and A. Stutzer (2004).

25 percent and, if the flyer allows checking a 'Do Not Disturb' box, reduces giving by 30 percent. The latter decrease is concentrated among donations smaller than \$10.

This field experiment highlights a common theme underlying the evidence for behavioral change – if given the option to **self-select** out of policy interventions, many individuals will choose to do so. Moreover, those that opt-out of policies might in many cases be precisely those that the policy is targeted towards.

Neuro-economics has further provided foundations for altruistic behavior. There has been evidence supporting the view that people derive non-pecuniary utility from mutual cooperation in social dilemma and from punishing unfair behaviour.¹⁸

Probabilistic Judgments

We tend to overestimate the likelihood of something very frightening (plane crash) or exciting (winning the lottery). We also overestimate the probability of a recent experience and underestimate the probability of things that happen relatively often.

Policies that could use these internal biases might include careers guidance for disadvantaged young people that highlight examples of educational success, or advertising campaigns that make the consequences of drink-driving more memorable and familiar¹⁹. When individuals base their decisions on anecdotes rather than reasoning probabilistically, they can become victims of shams. One study explored the market for quacks in which patients were modeled as relying on random, causal stories regarding the quality of a treatment to make a decision. As a result, patients were exposed to exploitation by healers. Even with governmental intervention, as long as the patients' reasoning is not lifted above the anecdotal level, ordinary competition policies may be ineffective²⁰.

Salience and Framing

Salience is a technique based on the observation that individuals pay particular attention to what appears **novel** (messages in flashing lights), **accessible** (items on sale next to checkouts) and **simple** (snappy slogan). For example, to reduce driving speed, the government painted a series of white stripes onto the road that are initially evenly spaced but get closer together as drivers reach a dangerous curve. This environmental design gives

¹⁸ E. Fehr, U. Fischbacher, and M. Kosfeld (2005) discuss recent neuro-economic evidence related to other-regarding (non-selfish) behaviors and the decision to trust in other people's non-selfish behavior. Mutual cooperation that takes place despite strong free-riding incentives, and the punishment of free riders in games is not irrational, but better understood as rational behavior of people with corresponding social preferences.

¹⁹ D. Halpern, C. Bates, G. Beales, and A. Heathfield. (2004).

²⁰ R. Spiegler (2006).

the sensation that driving speed is increasing (even when the speed does not really change), which in turn triggers the driver's natural instinct to slow down. The cost of sending such a visual signal is close to zero, but the effectiveness is very significant²¹. The Royal Mail used salience to discourage employees from taking sick leave by entering all staff who had not taken sick leave from a six-month period into a lottery to win a prize. This approach effectively reduced the number of sick leaves²².

Individual preferences are not fixed. A decision often depends on how the available choices are presented or 'framed'. Framing a decision as a choice between losses (glass half-empty) or gains (glass half-full) can lead to reversal in preferences even though the outcomes or expected values are identical²³. Experimental evidence shows that presenting a medical operation to a patient by saying "10% of those who underwent this procedure are dead after five years" or "90% were alive after five years" has a direct impact on the willingness of the patient to agree to such an operation²⁴. Similarly, it has been tested that the way ads for bank loans are framed can have a substantial impact on market demand.

M. Bertrand, D.S. Karlan, S. Mullainathan, E. Shafir, and J. Zinman (2005) report on a **field experiment** designed to analyze framing. A South African lender sent letters offering incumbent clients large, short-term loans at randomly chosen interest rates. The letters also contained independently randomized psychological "features" that were motivated by specific types of frames and cues shown to be powerful in the lab, but which, from a normative perspective, ought to have no impact. Consistent with standard economics, the interest rate significantly affected loan take-up. Inconsistent with standard neoclassical economics, some of the psychological features also significantly affected take-up. The average effect of a psychological manipulation was equivalent to a one half percentage point change in the monthly interest rate. The psychological features appear to have greater impact in the context of less advantageous offers and persist across different income and education level.

This field experiment highlights another important element underlying the evidence for behavioral change: policies might have heterogeneous effects across individuals. As such policies might have adverse effects on equity. We return to this issue in Section 6 where we

²¹ C.R. Sunstein and R. H. Thaler (2003).

²² Y.P. Kwan (2005).

²³ D. Kahneman and A. Tversky. (1979)

²⁴ D.A. Redelmeier, P. Rozin and D. Kahneman (1993) argue that individuals sometimes treat safety and danger categorically, undervalue the importance of a partial risk reduction, are influenced by the way in which a problem is framed, and inappropriately evaluate an action by its subsequent outcome. In the domain of emotions, people tend to consider losses as more significant than the corresponding gains, are imperfect at predicting future preferences, distort their memories of past personal experiences, have difficulty resolving inconsistencies between emotions and rationality, and worry with an intensity disproportionate to the actual danger.

discuss the broader issues related to the ethical and equity concerns of policies designed to induce behavioral change.

Time Preferences

In contemplating a prospective decision, people judge the **long-term** benefit against short-term rewards which results in them having some implicit discount rate through which they weight future costs and benefits relative to current costs and benefits. Discount rates are found to vary from person to person²⁵ and across settings²⁶. Empirical and experimental evidence reveals that individuals do not make decisions in a time-consistent manner using a constant discount rate²⁷. We tend to value today over tomorrow²⁸. As a result, immediate losses can be stronger incentives than long-term rewards. Thus, not only the amount but the **timing** of financial incentives should be taken into consideration when deciding on an intervention. For example, to encourage Canadians to install ultra-low-flow toilets and showers, customers were offered purchasers an interest-free loan to be paid off as part of the water bill. Not only was the equipment practically free, but water bills would be cheaper in the future²⁹.

These issues are key to ensuring long term behavioral change is induced.

Reference Points

Individuals often value items depending on the **relative change** in value from a reference point. Therefore utility is dependent on a reference point and is determined by gains and losses relative to this reference point, not final outcomes³⁰. An implication of this type of internal factor is that a small financial incentive could lead to large behavioral change if judged relative to an even smaller reference point. On the other hand, if expectations set a high reference point, certain outcomes may be perceived as losses or as unfair, reducing the utility associated with consumption or changes in behavior³¹. Policy makers can better determine an appropriate amount of financial incentive by correctly evaluating the reference point, or manipulating the reference point say through changing **default** options.

²⁵ D. Halpern, C. Bates, G. Beales, and A. Heathfield. (2004).

²⁶ S. Frederick, G. Loewenstein, T. O'Donoghue (2002).

²⁷ S. DellaVigna and U. Malmendier. (2004) analyse the sale of goods with delayed benefits (or delayed costs) to time-inconsistent consumers. Their motivating example is pricing at health clubs: they think of consumers as incurring a short-run disutility when visiting a club, and enjoying a delayed reward in the form of better health.

²⁸ T. O'Donoghue and M. Rabin (1999).

²⁹ E. Dawney and H. Shah (2005).

³⁰ D. Kahneman and A. Tversky (1979).

³¹ B. Schwartz (2004).

Loss-Aversion

It has been shown that people put more effort into preventing a loss than securing a gain. For instance, people are ready to pay (willingness-to-pay) only a little to get something while they will demand more to give up something they already have (willingness-to-accept)³². Of relevance to policy, willingness-to-pay must be carefully compared with willingness-to-accept. Indeed a fine can be a much stronger disincentive than a reward is an incentive even if they are of comparable amount. David Pearce suggested that willingness-to-accept (i.e. a reward) should be used by policy makers when people have the right to something and willingness-to-pay (i.e. a fine) should be used when people only have the right to the status quo³³. For example, for preventive health care use, messages stressing the potentially negative consequences of ill health tend to be more effective than those that phrase the benefits in terms of potential gains^{34, 35}.

People tend to over-react to changes, especially losses. People exaggerate how long sensations of gains and losses will last. By exaggerating the persistence of the sensation of loss and gain, we tend to **over-react** to changes. We also isolate particular experiences and decisions from each other. Losing \$20 in a bet makes individuals feel bad, but tend to feel worse because individuals rarely think in broader, long-term perspective, where these losses will almost surely be overwhelmed in the longer term by other gains³⁶.

Bounded Rationality

People are more likely to defer **complex** decisions and thus require significant mental effort. In other words, individuals' rationality is bounded by psychological and environmental constraints³⁷. Similarly, as the number of choices for a decision increases, so can sensitivity to regret, unrealistic expectations, and the opportunity costs of choosing one alternative³⁸. Consumers can prefer not to choose at all. This has been demonstrated for

³² P. Heidhues and B. Koszegi (2004) explore many aspects of pricing to consumers who experience loss aversion. consider a world in which demand and cost are both random and time-varying.

³³ D. Kahneman, L. Knetsch, and R.H Thaler, (1990).

³⁴ J.B. Detweiler, B.T.Bedell, P. Salovey, E. Pronin, and A.J. Rothman (1999) present evidence from an experiment comparing the effectiveness of four differently framed messages (2 highlighting losses and 2 highlighting gains) to persuade 217 beach-goers to obtain and use sunscreen. Attitudes and intentions were measured before and after the delivery of the framed information. People who read either of the 2 gain-framed brochures, compared with those who read either of the 2 loss-framed brochures, were significantly more likely to request sunscreen, intend to repeatedly apply sunscreen and intend to use sunscreen with a SPF 15 or higher.

³⁵ D. Kahneman, L. Knetsch and R.H. Thaler (1990) describe a field experiment in which coffee mugs are randomly given to half the subjects in an experiment. Markets for the mugs are then conducted. Half of the mugs should be traded according to the Coase theorem but observe volume is always less.

³⁶ M. Rabin (2002).

³⁷ J. Conlisk (1996).

³⁸ B. Schwartz (2004).

households' choice of electricity supplier in deregulated retail markets³⁹. In fact, people tend to choose "the path of least resistance" when faced with a difficult decision.

New formal approaches have been found to model differences in agents' cognitive abilities. One way is to allow some agents to implement very simple strategies (buying if price is above a threshold), whereas others can implement non-monotone strategies involving two or more cutoffs⁴⁰. Another way is to assume agents differ in the length of time of the history of prices they can recall⁴¹. We are unaware of any evidence testing whether such new models of behavior are validated by behavior in the real world.

There is a wide range of possible intervention designs to reduce the burden of gathering and processing information. For instance, selecting a pension scheme can be difficult, especially because it deals with a far-off future. Information provision alone has not been successful because people may not act on it. To remedy this situation, the Pensions Commission changed pension defaults. Employees are automatically joined to a pension plan, but still have the option of opting out. In the same manner, setting a default option on organ donation greatly increases organ donation rates. Data suggest that changing the default position in the UK law could increase donation rates by 50%⁴². In a recent US experiment, putting the tax on the label, rather than adding it at the till, led to a decrease of 8% in sales. This has been used to reduce alcohol consumption⁴³.

Mental Accounts

People tend to categorize money into different budgets or mental accounts, such as salary, savings or expenses⁴⁴. Consumption that is apparently suboptimal according to standard economic theory can be explained by differences in the decision criteria used in different mental accounts⁴⁵. Identical incentives can thus have a very different impact depending on the context. A practical implication is that policies may encourage people to save or spend money by explicitly **labeling** accounts.

³⁹ T.J. Brennan (2007).

⁴⁰ A. Rubinstein (1998).

⁴¹ M. Piccione and A. Rubinstein (2003)

⁴² R.W. Gimbel, M.A. Strosberg, S.E. Lehrman, E. Gefenas and F. Taft. (2003).

⁴³ R. Chetty, A. Looney and K. Kroft (2009) show that consumers under-react to taxes that are not salient. First, using a field experiment in a grocery store, we find that posting tax-inclusive price tags reduces demand by 8%. Second, increases in taxes included in posted prices reduce alcohol consumption more than increases in taxes applied at the register.

⁴⁴ H.M. Shefrin, R. Thaler (2004).

⁴⁵ R. Thaler (1999).

Choice from Lists

The standard economic choice model assumes that the decision maker chooses from sets of alternatives. However, in many cases, we can be faced with a choice from among a **list**. For example, job offers and online purchases are presented in the form of a physical list. Lists can also be virtual in the sense that the individual thinks of a set of alternatives in some sequential manner. It appears that the **order** in which we encounter the alternatives may affect our choice.

This can give rise to a primacy effect and a recency effect. The former gives advantage to the first few alternatives in a list since people examine them more attentively and the latter gives advantage to the last few alternatives as people recall more vividly what they have just seen. Special attention can be paid to alternatives that stand out relative to their neighbors in the list. For instance, a low-priced item will draw special attention if it is surrounded by high-priced items. In addition, the first element in a list may serve as a reference point to which subsequent alternatives are compared⁴⁶ and thus choice may depend on the element that appears first. For example, if the items in a list differ in quality, then that first item may serve as a benchmark to which the quality of subsequent items is compared.

Several empirical papers have reported on order effects in panel decisions in contests such as the World Figure Skating Competition⁴⁷, the Eurovision Song Contest⁴⁸, the International Synchronized Swimming Competition⁴⁹ and the Queen Elisabeth Contest for violin and piano⁵⁰. In these contests, the contestants appear sequentially and each judge awards each of them a numerical evaluation. The winner is the participant who receives the largest total number of points. It was found that the last few participants in the contest have an advantage since judges tend to increase the points they award over the course of the sequence.

Other experiments have detected that people tend to favour middle positions over endpoints. Indeed, this was observed in a two-person game where one player “hides” a treasure in one of four places laid out in a row and the other player “seeks” it⁵¹. Both “hidiers” and “seekers” favored middle positions. Similarly, in multiple choice questions in test, both test takers and test makers have the tendency to hide and look for the correct answer in middle positions⁵². Finally, it was found that people tend to make a selection

⁴⁶ A. Tversky and D. Kahneman (1991).

⁴⁷ B.W. de Bruin (2005).

⁴⁸ Idem.

⁴⁹ V.E. Wilson. (1977).

⁵⁰ H. Glejser and B. Heyndels (2001).

⁵¹ A. Rubinstein, A. Tversky, and D. Heller. (1996).

⁵² Y. Attali and M. Bar-Hillel (2003).

from the middle when choosing a product from a grocery shelf, deciding which bathroom stall to use or marking a box in a questionnaire⁵³.

Information

Information has an important role in decision making as recognized in economics, psychology and public health literatures. **Learning** and **awareness** have been widely used in behaviour change interventions to bring about long run behavioral change. However, real world information campaigns have had very different outcomes for different people. Better educated individuals with higher income tend to be more affected by informational campaigns. Hence such policy interventions can widen inequalities, an issue we return to in Section 6.

In relation to some of the internal factors discussed above, information *per se* can have counter-productive results. Having too much information or more choice can be confusing and reduce the feeling of self-efficacy. Because of the amount of recycling option available, some people can be confused and decide not to recycle. One experimental study suggested that using salience through color coded containers increased the recycling rate by 34 %⁵⁴.

A key set of findings was that the most effective information in promoting residential energy efficiency was simple, salient, personally relevant, and easily comparable rather than technical, detailed, factual, and comprehensive. The perceived trustworthiness and credibility of the information and/or service provider was also important⁵⁵.

Building on this, there is evidence showing that people tend to **trust** information given by an expert. It was noticed that health interventions were more effective when delivered by trained facilitator or teachers than by research assistant⁵⁶. Therefore, when designing an educational programme, the person communicating should be targeted to his audience and preferable be an 'expert' in the field.

Other studies show that demographic and behavioral similarities between the messenger and the audience can improve the effectiveness of the intervention. Moreover, people from a lower socioeconomic group are more sensitive to the characteristics of the messenger⁵⁷.

⁵³ N. Christenfeld (1995).

⁵⁴ S. Duffy and M. Verges (2009) present evidence from a field experiment in which thirty waste receptacles were assigned to a *lids-present* and *lids-absent* condition, and the number of recyclable items found in recycling and waste bins served as the dependent measure. Results indicated the presence of specialized recycling container lids increased the beverage-recycling rate by 34%.

⁵⁵ C. Wilson and H. Dowlatabadi, (2007)

⁵⁶ L.T. Webb and P. Sheeran, (2006) review 47 experimental tests of intention-behavior relations that satisfied these criteria. Meta-analysis showed that a medium-to-large change in intention ($d = 0.66$) leads to a small-to-medium change in behavior ($d = 0.36$)

⁵⁷ M.R. Durantini, D. Albarracin, A.L. Mitchell, A.N. Earl, and J.C. Gillette (2006).

The London borough of Brent choose youth officers who were previously in street gangs to talk to young about the risks of becoming involved in gun crime. **Personal affiliation** and authority figures are important factors in behavioral influence⁵⁸.

Support groups among people with existing illness have similarly been found to significantly improve outcomes. The efficacy of self-management for chronic illness has been found to be most effective when combined with a support group⁵⁹. Even 'virtual' mutual support seems to help. For example, an e-mail discussion group for back pain was found to lead to significant improvements in pain, disability and distress, as well as a 46% reduction in visits to the doctor⁶⁰. Lay-led interventions often appear to work as well as professionally led support, suggesting the high value of tacit knowledge and emotional sympathy of fellow sufferers⁶¹.

Three types of individual have been identified as driving social change: mavens, connectors and salesmen. "Mavens" freely share their expertise, "connectors" play the role of transmitting information their interactions and finally "salesmen" persuade the adoption⁶². This suggests that it might be useful for policy makers to focus their attention on them since they will promote wider change. The 'Health Buddy' scheme for instance used social networks. Older students received health advice from their teachers and they themselves acted as mentors to younger students by given them health lessons. Compared with control students, both older and younger buddies participating in this programme showed an increase in health knowledge and behavior which had a positive impact on weight loss⁶³.

The use of change agents in disseminating information and experience about technologies is widely employed in agriculture and public health⁶⁴ and also helps promote social learning on residential energy efficiency⁶⁵. Providing opportunities for homeowners or utility managers to learn from early adopters' experience of solar photovoltaics supported diffusion more effectively than detailed technical information⁶⁶. There has also been evidence that word-to-mouth communication may be effective in changing behaviors.⁶⁷

⁵⁸ D. Halpern, C. Bates, G. Beales, and A. Heathfield. (2004).

⁵⁹ E. Gossel and T Cronan (2000).

⁶⁰ K. Lorig, D. Laurent, R. Deyo, M. Marnell, M. Minor, and P. Ritter (2002).

⁶¹ J.L. Cohen, S.V. Sauter, R.F. de Vellis, B.M. deVellis. (1986)

M. von Kroff, J.E. Moore, K. Lorig, D.C. Cherkin, K. Saunders, V.M González, D. Laurent, C. Rutter, F. Comite. J.L. Gilden, M.S. Hendryx, S. Clar, C. Casia and S.P. Singh (1992)

⁶² E. Dawnay and H. Shah (2005).

⁶³ S. Stock, C. Miranda, S. Evans, S. Plessis, J. Ridley, S. Yeh, and J.P. Chanoine. (2007).

⁶⁴ E.M. Rogers (2003).

⁶⁵ S. Darby (2006).

⁶⁶ W. Jager. (2006).

⁶⁷ G. Ellison and D. Fudenberg (1995) present a theoretical analysis showing word-to-mouth communication may lead to all players adopting the action that is on average superior. The structure of the communication

Scarcity

Scarcity refers to how people tend to value things that are likely to run out. In the standard neoclassical economics framework, price is a proxy for scarcity. Higher prices cause greater product use either through a **sunk-cost**⁶⁸ or **screening** effect⁶⁹. The former refers to the use of a product just because an individual has paid for it. The screening effect refers to the fact that higher prices skew the composition of buys towards household with a greater propensity to use the product.

The debate on whether and how much should be charged for public health provision revolves around this tendency for individual to undervalue gifts. Higher prices can increase use, either by targeting distribution to high-use households (a screening effect), or by stimulating use psychologically through a sunk-cost effect. An experiment in the domain of health product use designed to separate these two effects provided strong support for the screening effect hypothesis rather than the sunk-cost effect⁷⁰. This implies that households have private information about their behaviour (using the product or not) that is reflected in the willingness-to-pay. For policy-makers, this cast doubt on justification for health product pricing based on sunk cost effects, while suggesting a possible role for prices as an allocative tool.

In the remainder of this section we focus attention on internal factors driving addictive behaviors. In the Appendix we provide a more complete overview of theories of addiction from alternative disciplines.

Addiction and Self-Control

Addictive behaviors do not meet the standard rationality definition. Addicts are typically characterized by preference for immediate reward and time inconsistency. Moreover, people do not have a perfect foresight and are not always aware of the future consequences of their addictive behaviour⁷¹.

process determines whether all agents end up making the same choices, with less communication making this conformity more likely.

⁶⁸ E. Eyster (2002).

⁶⁹ S. M. Oster (1995)

⁷⁰ N. Ashraf, J. Berry and J. M. Shapiro. (2007) develop a methodology for separating these two effects in a field experiment in Zambia using door-to-door marketing of a home water purification solution. They find that higher willingness-to-pay for a product is associated with a greater propensity to use (screening effect). They do not find evidence that paying a higher transaction price are more likely to use the product (sunk-cost effect).

⁷¹ F. Gul and W. Pesendorfer. (2001)

Addictive behaviour requires special attention as it affects not only our choices but also our needs and desires. It involves non-conscious impulses as well as conscious urges. The role of habit and emotional attachment to the object of the addiction is crucial in addictive behaviors. Finally, the sense of identity can be altered. Hence, understanding addiction requires an understanding of various motivational elements.

Different activities or objects of desire and individuals have different probability of becoming addictive. There is some evidence indicating the strong impact of environmental factors in determining addiction. Adolescent initiation of substance use, a powerful predictor of adult substance use diagnosis, is influenced primarily by environmental rather than genetic factors⁷². However, there is also evidence indicating the role of genetics in addictive behaviour such as gambling⁷³ and smoking⁷⁴. Different environmental conditions, like opportunity, boredom and stressors, can be conducive to the development of an addiction. Social and cultural norms can play a role⁷⁵. It is common for initiation of one pattern of addictive behaviour to be associated with later development of another one that involves greater costs and more extreme rewarding effects (such as the hypothesized transitions across drug usage, or from petty to serious crime). This is called the **gateway** phenomenon⁷⁶.

Behavioral economists view addictive behaviors as “the pursuit of immediate gratification in a way that we ourselves do not appreciate in the long run”⁷⁷. The economic model of rational addiction shows that through time inconsistency, addictive behaviors result in negative externalities: current consumption negatively affects future well-being. Negative externalities combined with habit formation form the trap of addiction. As a person consumes more and more of the addictive product, the pleasure diminishes, yet the harmful behaviour continues because it is more and more difficult to stop. **Timing** of the

⁷² C. Han, M.K. McGue et W. Iacono, (1999) present evidence based on 327 monozygotic and 174 like-sex dizygotic twin pairs born in Minnesota and aged 17-18 years at time of assessment. Biometrical methods were used to estimate the contribution of additive genetic, shared and non-shared environmental factors to adolescent substance use. The heritability for the liabilities to tobacco, alcohol and other drug use was estimated to be 59%, 60% and 33% among males, and 11%, 10% and 11% among females. However, the gender difference was not statistically significant. Estimates of shared environmental effect were substantial and insignificantly higher among females (71%, 68% and 36%, respectively) than among males (18%, 23% and 23%, respectively). The covariation among the three substance use phenotypes could be accounted for by a common underlying substance use factor.

⁷³A. Blaszczynski, Z. Steel and N. McConaghy (1997) examined the potential role of impulsivity using the Eysenck Impulsivity Scale among 115 pathological gamblers. Results indicate that heightened impulsivity is associated with the degree of severity of psychological and behavioural change in pathological gamblers.

⁷⁴ V. Batra, A.A. Patkar, W.H. Berrettini, S.P. Weinstein and F.T. Leone (2003) review the literature, showing that heritability estimates for smoking in twin studies have ranged from 46 to 84%, indicating a substantial genetic component to smoking. However, environmental factors have also been found to contribute to the risk of initiation and persistence of smoking

⁷⁵ R.E. Vuchinich and N. Heather (2003)

⁷⁶ D.B. Kandel, K. Yamaguchi and K. Chen (1992).

⁷⁷ T.O'Donoghue and M. Rabin (2000).

rewards and costs of the activity, as well as the person's awareness of future self-control problems are important factors.

Some pharmacological interventions can help addicts to maintain control over the behaviour. Nicotine for smokers, acamprosate for alcoholics or methadone for drug users are examples of such medical interventions⁷⁸. Psychological interventions such as group therapy can also be use. However the effects do not seem to outlast the duration of the treatment. Community-wide measures through prices can be used to reduce the opportunity to engage in risky and addictive behaviors or increase their costs⁷⁹.

Interventions which aim at increasing self-efficacy have been evaluated. These interventions range from computer-generated tailored letters to intensive group-based discussion. However, there has been little evidence to determine whether increases in self-efficacy change behaviour⁸⁰.

Habits

Habits are behaviour sequences that are or have become automatic and thus require little or no cognitive effort. Addictive behaviors, like smoking, are closely related to habits and can be extremely difficult to change. Financial incentives have been used to break old habits. This instrument has been successful in discouraging the use of plastic bags in Ireland. The introduction of small charges for plastic bags was enough of an incentive to make people bring their own grocery bags. Similarly, the congestion charge may have acted as a signal not to use cars in the centre of London. A negative side-effect of a financial reward can be that once an activity is associated with it, individuals are less inclined to participate with the activity in the future without further incentive⁸¹. For instance, providing an incentive for people to quit smoking may lead them to be reluctant to quit other harmful activities (like alcohol misuse) without similar rewards.

⁷⁸ A.R. Lingford-Hughes, S. Welch, and D.J. Nutt (2004).

⁷⁹ K. Jamrozik (2004).

⁸⁰ J. Hyde, M. Hankins, A. Deale and T. M. Marteau. (2008) review ten studies targeting tobacco smoking, alcohol and illicit drug use were evaluated. Seven of the ten studies reported positive effects of interventions upon self-efficacy. The two that assessed behaviour change reported a significant effect but behaviour change could not reliably be attributed to self-efficacy.

⁸¹ E.L. Deci, R. Kroestner and R.M. Ryan. (1999) present a meta-analysis of 128 studies examined the effects of extrinsic rewards on intrinsic motivation. As predicted, engagement-contingent, completion-contingent, and performance-contingent rewards significantly undermined free-choice intrinsic motivation ($d = -0.40, -0.36,$ and $-0.28,$ respectively), as did all rewards, all tangible rewards, and all expected rewards. Engagement-contingent and completion-contingent rewards also significantly undermined self-reported interest ($d = -0.15,$ and $-0.17,$), as did all tangible rewards and all expected rewards. Positive feedback enhanced both free-choice behavior ($d = 0.33$) and self-reported interest ($d = 0.31$). Tangible rewards tended to be more detrimental for children than college students, and verbal rewards tended to be less enhancing for children than college students.

Habitual behaviors are activated by **situational cues** like sights, words or sensations. Therefore, detecting and altering these cues, a technique called **priming**, might be helpful in changing the habit. For instance, having visible recycling facilities, a visual cue, can help remind us to recycle⁸². An experiment revealed that asking people to make a sentence out of words such as fit, lean, active or athletic made them significantly more likely to use the stairs rather than the lifts. Similarly, deliberately placing walking shoes or fitness magazines may prime a healthy lifestyle in people⁸³. The scent of all-purpose cleaner made significantly more people keep a cleaner table⁸⁴. It is still not well understood whether priming effects are long lasting or what determines why some primes are more effective than others.

While most policies attack existing habits, preventing bad habits to appear in the first place should also be considered. Media and informational campaigns can be useful, as discussed above. The FRANK drug campaign used a 'risk image' campaign to prevent drug use. It presented the image of a drug addict. The campaign was evaluated by comparing how the perception of a drug addict had changed after the campaign.

Temptation and Willpower

Many people are aware of their tendency to overspend or overeat. Hence many individuals choose **commitment devices** to achieve long-term goals. Commitment has been used to fight against drunk driving has been used in certain American states. Those convicted of drunk driving have to install breath-monitoring gadgets in their car, which prevents engines from starting until drivers blow into alcohol detectors. In order to quit smoking, a new product combining commitment and financial tactics has been found. Individuals are offered a saving account in which they deposit funds for six months, after which they take a nicotine test. Only if they pass is the money returned to them. Surprise tests after a year proved possible lasting effects. Commitment is also used to help addictive behaviors such as pathological gambling. Gamblers can sign a self-exclusion contract offered by some casinos to limit gaming opportunities. An evaluation of people who had signed contracts in

⁸² T. Jackson (2005).

⁸³ J. Wryobeck and Y. Chen (2003) present experimental data on 48 young adults who completed a "language proficiency task" which would either activate a healthy lifestyle schema in the experimental condition or a neutral schema in the control condition. Participants in the experimental condition were more likely than the control group to use stairs, instead of elevators, to move up one floor to attend another unrelated study.

⁸⁴ R. W. Holland, M. Hendriks, and H. Aarts (2005) present evidence that when participants were unobtrusively exposed to citrus-scented all-purpose cleaner, the mental accessibility of the behavior concept of cleaning was enhanced, as was indicated by faster identification of cleaning-related words in a lexical decision task and higher frequency of listing cleaning-related activities when describing expected behavior during the day. Another study established that the mere exposure to the scent of all-purpose cleaner caused participants to keep their direct environment more clean during an eating task. Awareness checks showed that participants were unaware of this influence..

Quebec showed that the urge to gamble was reduced while the perception of control increased significantly for participants.

R. Ladouceur, C. Sylvain, and P. Gosselin (2007) show that individuals who excluded themselves (N = 161 at the initial stage) participated in telephone interviews after signing the self-exclusion agreement and were followed at 6, 12, 18 and 24-months. Results show that 73.1% of the participants were pathological gamblers. During the follow-ups, the urge to gamble was significantly reduced while the perception of control increased significantly for all participants. This highlights the general point that policy interventions with voluntary compliance, might lead some individuals to **self-select** out of the intervention. This might be especially the case for interventions designed to target addictive behaviors.

4. POINTS OF INTERVENTION AT A COMMUNITY LEVEL

1. What is known about how behaviour can be influenced? What special considerations apply to addictive behaviour?
2. What are the policy implications of recent developments in research on behaviour change?

In this section we review various forms of **external factor** driving behavior change at a community wide level, as emphasized in the social psychology and sociology literatures. We also provide evidence on these external factors driving individual decision-making.

Norms

Norms provide implicit guidelines on acceptable behaviour. Social norms can be subdivided into 'descriptive norms' and 'injunctive norms'⁸⁵. **Descriptive norms** are based on the observation of how the majority act, while **injunctive norms** specify what ought to be done. These types of norm often operate in the same direction, but not always. Speeding on a motorway for instance can be socially acceptable in descriptive norms but not in injunctive norms.

It has been observed that we are strongly influence by the behaviors of others, particularly by those who are similar to ourselves. If a practice is seen as widespread we tend to conform to it and reproduce it. For instance, the inclination to cheat depends on how common it is around us⁸⁶. In addition, the perception others have of us matters. Peer pressure, for instance, has been largely blamed for smoking among teenagers⁸⁷. There is also evidence showing that we are more likely to gain weight if our friends are more obese⁸⁸.

⁸⁵ R.B. Cialdini (1993).

⁸⁶ D. Ariely (2008).

⁸⁷ O.D. Duncan, A.O. Haller and A. Portes, (1968).

⁸⁸ N.A. Christakis and J.H. Fowler (2007) present evidence from a study in which an interconnected social network of 12,067 people was assessed repeatedly from 1971 to 2003 as part of the Framingham Heart Study. The body-mass index was available for all subjects. Longitudinal statistical models were used to examine whether weight gain in one person was associated with weight gain in his or her friends, siblings, spouse, and neighbor. A person's chances of becoming obese increased by 57 if he or she had a friend who became obese in a given interval. Among pairs of adult siblings, if one sibling became obese, the chance that the other would

The disrespect of social norms has traditionally been sanctioned by fines or threats of punishment.

Personal norms on the other hand reflect a feeling of moral obligation to act. In contrast to social norms, using financial sanctions when dealing with personal norms can lead to counter-productive outcomes. After receiving a punishment, people tend to feel exonerated since they have paid for their misdeed. They accept the punishment and continue with bad behaviour. An experiment in Israel showed that the introduction of small fines for parents who arrived late to collect their children from school resulted in parents arriving even later than before. Parents no longer felt guilty for arriving late since they were now paying for what they considered a service. Similarly to punishment, financial rewards can also be counter-productive. This is illustrated by the comparison between voluntary and paid blood donation. It was noticed that blood donated by volunteers was of a higher quality as they had to incentive to lie about diseases which could affect the admissibility of their blood⁸⁹. Another example can be taken from a Swiss study that shows that the average volunteering time is higher if the work is unpaid⁹⁰. The feeling of guilt can already be a strong internal sanction when we disrespect personal norms.

Media campaigns advertising social norms have changed behaviour in the past. An initial survey showed that individuals underestimated the extent to which other citizens used seatbelts. After the campaign 'Most of Us Wear Seatbelts', informing the true proportion of people who used seatbelts, the self-reported seatbelt used increased⁹¹. Another example is the large-scale programme for energy conservation. This programme sent letters that provided social comparison between a household's energy use and that of its neighbors. This reduced consumption by 2% relative to the baseline. By continuing to send letters over the months, the positive effect reinforced itself⁹². However, for households who were consuming less than the average, their consumption increased⁹³. Therefore, policy-makers may actually worsen situation by making a bad behaviour appear like a norm.

become obese increased by 40%. If one spouse became obese, the likelihood that the other spouse would become obese increased by 37% . These effects were not seen among neighbors in the immediate geographic location. Persons of the same sex had relatively greater influence on each other than those of the opposite sex.

⁸⁹ R.M. Titmuss, A. Oakley and J. Ashton (1970).

⁹⁰ B.S. Frey and L. Goette (1999).

⁹¹ Linkenbach and Perkins (2003).

⁹² H. Allcott (2009) uses data from randomized natural field experiment at 80,000 treatment and control households in Minnesota, it is estimated that the monthly program reduces energy consumption by 1.9 to 2.0 percent relative to baseline.

⁹³ P. Schultz, J.M. Nolan, R.B. Cialdini, N.J. Goldstein and V. Griskevicius (2007).

Public Commitments

Commitment, especially publicly and in writing, monitored by the participating community can be an important instrument for policy-makers⁹⁴. When someone has promised to do something, they are likely to stick to it without reward or punishment. Staged crime scenes show that individuals who promise to watch over a stranger's belongings become more than 400% more likely to attempt to prevent a theft than those who are aware that something is being stolen but have no such prior commitment to protecting it⁹⁵. Public commitment and visible signals was been used by a Canadian policy intervention to change behaviour towards composting. Some websites like Pledgebank.com help people commit to something if other people do it too. Pledges like "I will start recycling if 100 people in my town do the same" use reciprocity to encourage positive behaviour. However, public commitment and the threat of shame are not always a good solution. Indeed, people might resort to even worse behaviour in order to avoid being discovered. For instance, to avoid being caught with banned chemical, people might pour it down the drain rather than admitting of possessing it.

Reciprocity

A person is more likely to act if they have been placed in a position of debt, even if unwillingly. Wine tasting at vineyards works on this principle. The first glass might be given for free but people feel obliged to buy in return. There may be ways in which similar effects can be achieved through 'social gifts' such as educational bursaries rather than couching such public expenditure in terms of 'rights' to services.

Regulations

The smoking ban in public areas is an example of a successful policy which has changed the social norm. The social acceptance of smoking has been reduced thereby reducing the amount people smoke in private too⁹⁶. Compulsory seatbelt use has also been a successful intervention. Although received with much opposition, this policy is now considered socially acceptable and has permanently altered the social norm.

⁹⁴ D. McKenzie-Mohr, W. Smith and W.A. Smith. (1999).

⁹⁵ D. Halpern, C. Bates, G. Beales, and A. Heathfield. (2004).

⁹⁶ L. Trotter, M. Wakefield and R. Borland (2002) conducted telephone surveys of a random sample of smokers in Australia. Of all adult smokers, 69% attended bars, nightclubs or gaming venues at least monthly. Of these smokers, 70% reported smoking more in these settings (socially cued smokers) and 25% indicated they would be likely to quit if smoking were banned in social venues. Compared to smokers not likely to quit if there were bans, smokers likely to quit were more likely to be socially cued, to be contemplating or preparing to quit, to approve of bans in social venues and to be aged under 30 years. Compared with smokers not socially cued, socially cued smokers were more likely to be under the age of 30 years, more likely to believe that there is a safe level of cigarette consumption, and more likely to have previously made a quit attempt.

Persuasion

Some beliefs are shaped by direct observation, but other beliefs are influenced by individuals or groups who themselves have an interest in the outcome. Information about products is delivered through advertising by the sellers, political information comes from candidates interested in winning elections, and financial data are released strategically to shape the perceptions of investors⁹⁷.

Several recent papers by economists use field experiments to estimate the effect of persuasive communication on sales. The results are mixed. Examining the number of catalogs received by mail on sales reveal that increasing the number of catalogs in an 8-month period from 12 to 17 increases the number of purchases during the test period by 5% for customers who had purchased frequently in the past and by 14% for those who had purchased relatively infrequently. The effect on the extensive margin (the share of customers who purchase at least one item) implies a higher persuasion rate for the frequent buyers than for the less frequent buyers⁹⁸. Online advertising experiment concerning purchases through Yahoo!. Of the subjects in the treatment group, 64% were shown ads. The purchases of the treatment group were 3% greater than the purchases of the control group, but this difference is not statistically significant⁹⁹. Finally, an experiment varied the interest rates offered in direct mail solicitations sent to customers as well as the persuasive features of the mailer, such as the picture displayed or the number of examples loans presented. Some features of the mailers—the picture displayed, for example—do have large effects on loan take-up, whereas others do not—comparisons with competitors, for example¹⁰⁰.

Another form of persuasion is communications from nonprofits or charities to solicit contributions. List and Lucking-Reiley (2002)¹⁰¹ send letters to raise funds for the purchase of computers for a center and randomize the amount of seed money (the amount already raised) stated in the different letters. In the low-seed treatment, 3.7% of recipients donate a positive amount, compared with 8.2% in the high-seed treatment. One interpretation is that seed money serves as a signal of charity quality. S. DellaVigna, J.A. List and U. Malmendier (2009)¹⁰² also conduct a door-to-door field experiment and find a sizeable persuasion rate, even for a relatively unknown out-of-state charity. Falk (2007)¹⁰³ shows that small gifts can significantly increase donations. Solicitation letters for schools in

⁹⁷ S. DellaVigna and M. Gentzkow (2009).

⁹⁸ D.I. Simester, P. Sun and J.N. Tsitsiklis. (2007).

⁹⁹ M. Lewis and D. Reiley. (2010).

¹⁰⁰ M. Bertrand, D.S. Karlan, S. Mullainathan, E. Shafir, and J. Zinman. (2010)

¹⁰¹ J.A. List and D. Lucking-Reiley (2002).

¹⁰² S. DellaVigna, J.A. List and U. Malmendier. (2009)

¹⁰³ A. Falk (2007).

Bangladesh induced substantially higher giving if they were accompanied by postcards designed by students of the school (20.6% giving) than if they were accompanied by no postcard (12.2% giving).

Contextual Factors

Contextual factors directly affect decisions and can reinforce habits. For example, having a recycling collection point near one's home, a good public transport system or access to a support group for alcohol abuse are all facilitating conditions. The absence of these conditions can lead to damaging or harmful behaviour. It has been noticed that if a few windows of a factory are broken, the tendency is for vandals to break a few more. Likewise, graffiti or littering can encourage another¹⁰⁴. The sight of guns can induce violent ideas which can then be a trigger to aggressive behavior. Hence, external conditions appear to be a prerequisite for behaviour change and sufficient resources should be given to remove external barriers preventing behaviour change¹⁰⁵. The presence or absence of these conditions is only relevant if the individual knows or can perceive them.

¹⁰⁴ K. Keizer, S. Lindenberg, and L. Steg. (2008)

¹⁰⁵ D. McKenzie-Mohr, W. Smith and W.A. Smith. (1999)

5. POLICY DESIGN

5. What should be classified as a behaviour change intervention?

6. How should different levels of interventions (individual, organizational, community and national) and different types of intervention (legislative, fiscal, education) interact in order to achieve policy goals more effectively?

7. Should behaviour change interventions be used in isolation or in combination with other policy interventions?

Defining Behavior Change Interventions

A behaviour change **intervention** attempts to shift individual behaviour through changes in the internal and external factors that drive decision making. In relation to some internal factors, these interventions can draw upon our underlying unconscious conditioned responses, or rely on our capacity of reasoning and reflection. They are especially appropriate when individuals make choices that they would change if they had complete information, unlimited cognitive abilities and no lack of willpower, as assumed in the neoclassical economics model¹⁰⁶.

Multiple Interventions

Policies should **combine different points of intervention** since behaviors are affected by numerous internal and external factors. A study of measures (energy tax, investment subsidies, gas use regulation) promoting residential energy efficiency in the Netherlands found that their combined effect on energy use was up to 30% less than the sum of their individual effects¹⁰⁷. Drunk driving demonstrates show how the combination of stiff penalties, good advertising and shifting social norms can change behavior quite significantly over a few decades.

Policies can be combined to target behavioral change over different time frames. For example, interventions designed to address contextual variables (e.g. price incentives) or personal variables (e.g. information to reinforce favorable attitudes) may aim for short-

¹⁰⁶ C.R. Sunstein and R.H. Thaler.(2003)

¹⁰⁷ P.G.M. Boonekamp (2006)

term change. When behavior is strongly affected by external factors, it will be important to in the longer term to build political support for policy change and social support for norm change. The ultimate goal should be a long term behaviour change. Therefore, **interventions should be sustained over time and continually reassessed** to effectively change behavior. A one-time intervention has much less chance of being successful. Moreover, if the policy is not **rigorously evaluated** using credible methods, policy makers have little chance of receiving the feedback that help them to understand which policies are effective and why. We return to this issue in Section 7 where we discuss UK research capacity to design and evaluate policy interventions.

However, by using different points of interventions, policy-makers run the risk of unintended negative side-effects and “policy cacophony”¹⁰⁸. Therefore, a **policy consistency** criterion should be established when assessing a prospective policy to avoid potential clashes in interventions. The collaboration of all levels of governance in formulating a common public policy might avoid such difficulties. However, we are not best placed to judge whether such coordinating systems are in place across tiers of government in the UK.

¹⁰⁸ T. Lang and G. Rayner, (2007)

6. ISSUES AROUND BEHAVIOUR CHANGE INTERVENTIONS

13. When is it appropriate for the state to intervene to influence the behavior of members of the public and how does this differ from when it is appropriate for the commercial or voluntary sector to intervene? In particular, when should this be done by outright prohibition and when by measures to encourage behavior change? Are some methods of producing behavior change unacceptable? Which and why?

14. Should the public be involved in the design and implementation of behaviour change policy interventions and, if so, how? Should proposed measures for securing behaviour change be subject to public engagement exercises or consultation? Should they be piloted? Do considerations differ in the case of interventions aimed at changing addictive behaviour?

Ethical Issues

An objection to behavioral change type interventions is that, in a liberal society, policy makers should not interfere in individuals' behaviors. Measures which act outside our conscious control such as priming are likely to be controversial. Therefore, policy-makers need to **involve and engage with target audiences** from as early a point as possible in the change process. Public debates can help understand and appreciate the behaviour change encouraged and help find an appropriate measure. Without public support, interventions may appear illegitimate and therefore be less effective.

The concept of **personal responsibility** can also help solve this tension. However, encouraging people to take responsibility without telling them what to do is not an easy task. Obesity prevention makes this evident. On the one hand, the government cannot forbid individuals to make unhealthy decisions but, on the other hand, these same individuals cannot expect others to pay the cost of their medical care. These issues might be especially problematic in the case of addictive behaviors, where individuals find themselves in a situation in which they are unwilling or unable to take personal responsibility.

Those in favor of behavioral change interventions advocate that state intervention to influence public behaviour is appropriate precisely when individuals make choices that are not in their best interest, choices that they would change if they had complete information,

unlimited cognitive abilities, and no lack of willpower, as is assumed in the neoclassical economics model¹⁰⁹.

Clearly, some forms of behavioral change occur all the time in the context of free markets where **firms** exploit the internal factors driving decision making. We have referred to such examples in earlier sections. In terms of the **voluntary sector**, we have also provided examples where charitable fundraising drives for example also seek to exploit internal and external factors to induce individuals to contribute more to good causes.

Equity Issues

For a policy to be acceptable, it should aim to be equitable both in its **procedure** and often in its **outcome**¹¹⁰.

For a measure to be procedurally equitable, it should typically be consistent across people and time, based on ethical code and involve citizen's in the decision making process. If the intervention is perceived as fairly implemented, individuals will more readily accept negative outcomes for themselves. This will in turn help lead to acceptance and cooperation by the public¹¹¹.

Interventions aimed at a particular group of people may create greater inequity of outcomes. For example it has been estimated that if carbon taxes were universally implemented, poorer groups would be worse off¹¹². Therefore other instruments targeted to these groups should be **simultaneously** used to compensate these inequities. The ban on public smoking and the provision of education and healthcare to all social groups¹¹³ are interventions which increased equity.

Policy Evaluation and Public Engagement

It is important to be able to learn from and provide credible evidence to policy makers and the public on behavioral change interventions. This requires interventions to be designed that have in-built methods of evaluation. The **gold standard** would be to design and implement policies using **field experiments** in which slightly different policies are randomly assigned to otherwise similar groups of individuals. Such an approach can identify the causal impact of the policy and potentially the underlying mechanisms behind why it did or did not succeed. The establishment of such a credible evidence base is essential to ensuring the public understand the consequences of behavioral change

¹⁰⁹ C.R. Sunstein and R.H. Thaler. (2003)

¹¹⁰ B.S. Frey, M. Benz, and A. Stutzer. (2004)

¹¹¹ I. Ajzen, L.H. Rosenthal, and T.C. Brown. (2000)

¹¹² M. Lewis. (2007)

¹¹³ D. Knott, S. Muers and S. Aldridge. (2008).

interventions, and that policy makers learn from interventions. Throughout the earlier sections, we have highlighted a number of such field experiments that have provided credible evidence on drivers of behavioral change.

In some cases, this evidence base from a field experiment might best be implemented through a **pilot study**. The results of the intervention can then be used to predict what would occur if the policy were to be **scaled-up**. The empirical methods needed to accurately predict what would occur if the policy were to be scaled-up need to be able to take account of two important differences between politic studies and nationwide or larger scale interventions.

The first is that the policy will then be intervening to a far wider audience. This might allow for greater degree of opt-out, or simultaneously change external factors that were not part of any pilot study. Second, the scaling-up method should also account for the fact that different non-governmental providers – such as the private and voluntary sectors - might also be involved in behavioral change interventions at a national level. This is important to recognize as the skills of the voluntary, private and public sectors differ and so similarly designed behavioral change interventions might have very different outcomes depending on who they are delivered by and how.

A key element of being able to justify, explain and promote behavioral change comes through the establishment and presentation of this credible evidence base. In turn, this can help shape norms and some external factors that themselves help promote future behavioral changes.

7. PRACTICAL CONSIDERATIONS

3. Is there adequate research capability within the United Kingdom to support the current pace of developments in behaviour change policy interventions? Is there sufficient funding for the evaluation of behaviour change interventions?
4. Are there adequate structures and expertise across government and the public services more generally to support the translation of research developments in behaviour change into policy interventions?
10. What mechanisms exist, at national and local government level, to provide advice and support during the design, piloting, implementation and evaluation of behaviour change interventions in order to ensure that they achieve intended policy goals and also cultural changes within government and public services more generally?
11. What mechanisms exist within government to coordinate and implement cross-departmental behaviour change policy interventions?
12. What mechanisms exist within government to cascade learning and best practice on behaviour change policy interventions?

The foundations for effective policy will always lie in a high-quality evidence base. High-quality evidence allows policymakers to choose the most effective policy instruments and also ensures value-for-money for taxpayers. We believe there is **research capacity** within the UK to provide this evidence base. We provide three examples that the authors are well familiar with. These differ slightly in their organizational design and degree of linkage with government departments.

The ESRC Centre for Economic Learning and Social Evolution (**ELSE**) based at University College London, is an inter-disciplinary research group bringing together economists and psychologists in recognition of the fact that psychologists and economists are concerned with substantially the same questions about behaviour. Two research themes at ELSE are of direct relevance to behavioral change policy interventions. The first theme relates to individual decision making. Combining the theoretical and empirical resources of economics, cognitive psychology and evolutionary psychology, researchers at ELSE investigate whether recent research on bounded rationality has underestimated the degree to which agents can achieve optimality in decision-making. The second broad research theme is on interactive decision making, in which we investigate how people deal with strategic situations, both by conducting laboratory and field experiments, and by mathematical modelling. We aim to advance our understanding of learning behaviour by

eschewing common simplifying assumptions, and to study how people may employ simple "heuristics" in interactive decision problems.

A second example is the Institute of Fiscal Studies (**IFS**). The IFS has much experience in the evaluation of microeconomic policy and the generation of empirical evidence. The goal of the IFS is to promote effective economic and social policies by understanding better their impact on individuals, families, businesses and the government's finances. Research findings are based on rigorous analysis, detailed empirical evidence and in-depth institutional knowledge. The IFS seeks to communicate them effectively, to a wide range of audiences, thereby maximising their impact on policy both directly and by informing public debate. The IFS is now established as Britain's leading independent microeconomic research institute, and as authoritative commentators on the public finances, tax and welfare policy, tax law, education, inequality and poverty, pensions, productivity and innovation, consumer behaviour and the evaluation of policies designed to promote development in poorer countries.

A third example is a model based on close **collaboration** between researchers and government departments. One example is the recently established Centre for Understanding Behavioral Change (**CUBEC**). This is a collaboration between the Department for Education and academic researchers from economics, psychology and neuroscience at the IFS and University of Bristol (DCSF). At the core of CUBEC's objectives are to develop new policy ideas based on recent advances in our understanding of human behaviour and decision making as discussed in this review. CUBECs work involves both short term rapid responses to the needs of the DFE, as well as longer term research on drivers of behavioral change in education policy. Of course, established policy advice units within the Cabinet Office also follow a similar model.

All these models allow research findings to be presented to policy makers as well as engaging the public. The Festival of Science is one mechanism through which the public can be engaged in academic research related to behavioral change policy interventions. The ELSE and IFS research groups also have close ties with voluntary sector organizations that might commission research or provide steers on the research agenda.

Irrespective of the precise model followed, policy needs to be based in part on the available evidence, and policies need to be continually and accurately evaluated. Policy evaluations allow policymakers to know the likely effectiveness of policy interventions, to judge whether they represent value for money and whether important lessons can be learned from any difficulties in implementation. The key ingredients to a successful and informative evaluation are the creation of a suitable control group, the availability of high-quality data and a sufficiently large sample size. The ideal way to create a suitable control

group is through randomized control trials. They are the standard benchmark for evaluations and trials in other disciplines, e.g. the trial of pharmaceutical products and medical interventions, and produce robust, high-quality evidence.

There are of course good reasons why true **randomisation can be difficult** in certain contexts. However, there are fairly simple ways to deal with such concerns, e.g. one can randomise within a group of already willing participants or target within tightly defined groups. One can also roll out a policy at different times across the country as was done with the evaluation of the Education Maintenance Allowance. A recurring problem in recent years in the UK has been that policies were often rolled out well before evaluations have been completed, or even first reported. Such early roll-outs can prevent one from knowing the full impact of a policy and from learning all the lessons from implementation.

The quality of an evaluation is only as good as the data available. As such, it is always important to **collect data** prior to the start of any policy initiative or pilot. This has not always been done in the past, with evaluations sometimes requested after a policy initiative has begun, which invariably lowers the reliability of the evidence produced.

An important innovation over recent years has been the use of **administrative data**, with the Department for Education and its predecessors at the forefront of the development and analysis of such datasets. This has helped increase the sample sizes of evaluations and allowed researchers to look in more detail at specific groups over time.

Academics are continually becoming more aware and better at promoting their work through the media and working in collaboration with local and national governments. This should be encouraged and funding offered explicitly for such purposes.

8. PAST INTERVENTIONS

8. Have publicly funded behaviour change interventions been both evidence-based and subject to effective evaluation? How successful have such interventions been?

9. Within government, how are the lessons learnt from the success or lack of success of behaviour change interventions fed back into the design of future interventions? Are lessons learned from industry and voluntary sector behaviour change activities also taken into account?

15. What lessons can be learnt from previous successful or unsuccessful behaviour change interventions in other countries? Which countries provide the most helpful examples of best practice? Are behavioral change interventions generally transferable between different societies?

In this section we review the findings of some well known behavioral change interventions from a number of countries, and relate these to the questions above. These interventions cover a variety of policy spheres such social behavior, community participation, the environment and health.

Some of these interventions have been conducted by policy makers, and others have been instigated by the voluntary sector. Moreover the examples we highlight come from a wide range of countries, With the correct evaluation methods, such as those form randomized field experiments, true causal policy impacts can be measured. As these relate to innate internal and external factors we expect the results from one setting to be insightful for policy design in other countries wherever external factors driving decision making are also similar.

Social Behaviour

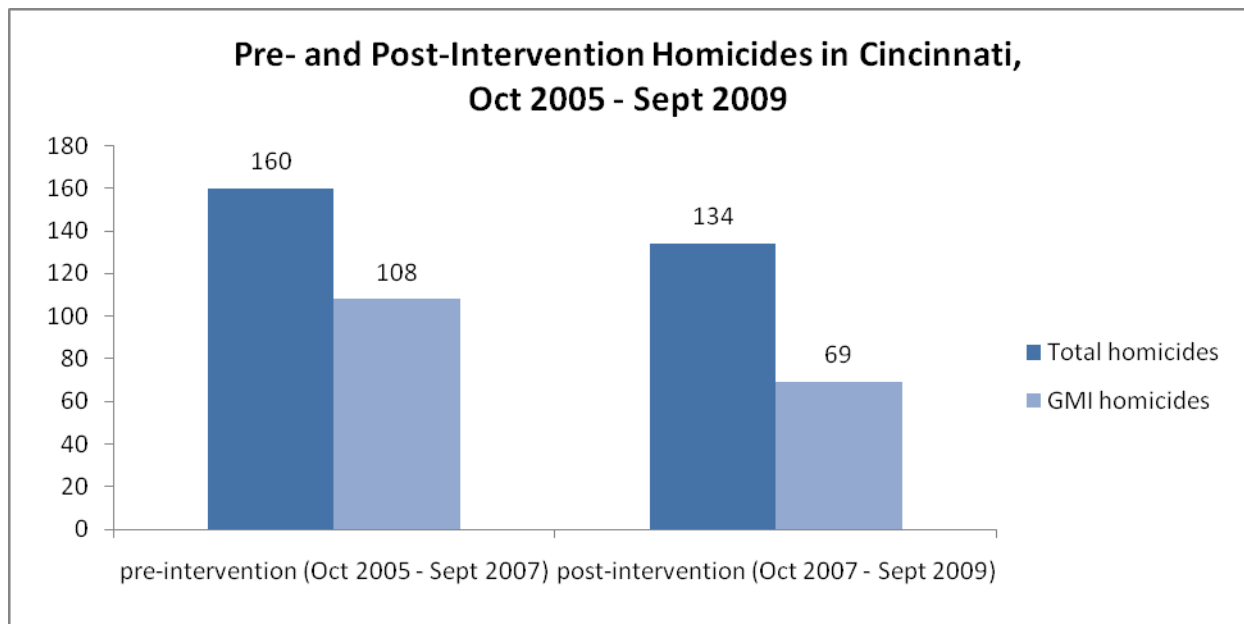
Cincinnati Initiative to Reduce Violence

The 'Cincinnati Initiative to Reduce Violence' (CIRV) programme draws on social norms and appropriate messengers to change behaviour. Gang members, responsible for much of the street violence, are strongly influenced by their peers. If criminal activities are seen as normal practice inside a gang, this creates incentives to reproduce these acts. This programme turned **social norms** inside a gang against it. If a gang member committed a crime, the entire gang was targeted for any type of offense. The CIRV programme was

combined with compulsory meetings with members of local communities, victims' relatives and ex-offenders as a condition of their parole. The purpose of these discussions was to expose gang members to wider social norms. Similar programmes have been launched across the United States. In Chicago, shootings and killings dropped between 41 and 73%. In Cincinnati, gang-related homicides fell by 50% in the first nine months¹¹⁴.

The figure below provides a basic assessment of the policy effectiveness. Post-intervention total interventions were lower than pre-intervention. However, this research design is unable to establish whether this decline is causally related to the programme, or this reduction might have occurred over time in any case (perhaps due to other policies put into place at the same time in Cincinnati). Had the policy been evaluated using a field experimental design where, say, some neighborhoods had been exposed to the policy initiative and others left as control neighborhoods, it would have been possible to measure the causal impact of the policy on crime. This is a pre-requisite to conducting a full cost-benefit analysis of whether the policy generates a return or whether the same budget could be used in more cost-effective ways to reduce crime.

Notwithstanding these evaluation concerns, there have been lessons learned in the UK from this policy. The strategy was also used in 2008 by Scotland's Violence Reduction Unit.

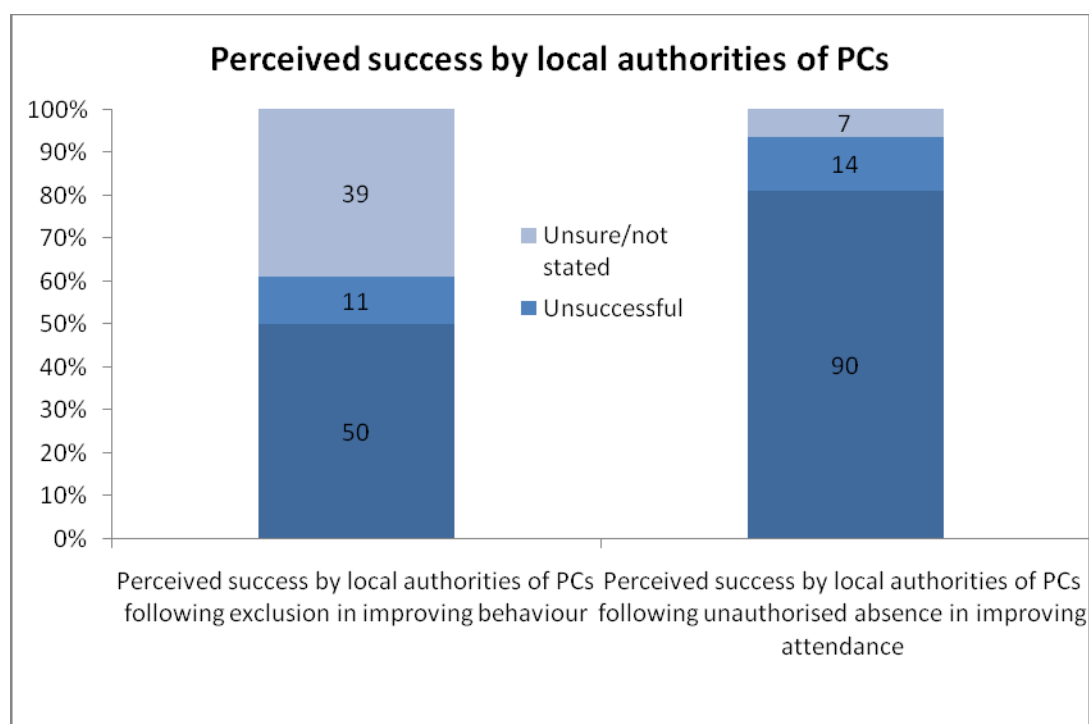


Education-Related Parenting Contract and Parenting Order

The 'Education-related Parenting Contract' was adopted by local English authorities in 2004. Parents and either school or local authority get together and agree on ways in which parents can reinforce parental responsibility for school attendance and general behavior.

¹¹⁴ W.G. Skogan, S.M Hartnett, N. Bump and J. Dubois. (2009).

At first, there is no sanction if attendance does not improve. However, school or local authority can apply for a 'Parenting Order' (a civil order) if behaviour does not improve within a certain period of time. Courts can then take non-compliance with the Contract into account when considering whether to grant an Order and contemplate prosecution. An evaluation in 2008 showed the majority of schools saw attendances improve as a result of using these voluntary agreements. As shown in the figure below, schools, local authorities and parents were generally positive about the role of Parental Contracts in reducing non-attendance and improving behaviour¹¹⁵.



Anti-social Behaviour Orders (ASBOs) and Acceptable Behaviour Contracts (ABCs)

Anti-social Behaviour Orders (ASBOs) were introduced by the Crime and Disorder Act 1998. ASBOs enabled the police, local authorities, social landlords and the transport police to obtain an order to prohibit a person aged 10 or above from engaging in behaviors specified by the order. Violation of the order can result in criminal prosecutions and a custodial sentence of up to five years. Hence ASBOs make explicit that a behaviour is **not socially acceptable**, and impose a clear condition or punishment for those who breach the order. A review of the use of ASBOs concluded that they could reduce anti-social behaviour in individuals given the order and in the wider group, and increased public confidence in the partner agencies¹¹⁶.

¹¹⁵ L. Evans, L. Hall and S. Wreford, (2008)

¹¹⁶ S. Campbell (2002)

Acceptable Behaviour Contracts (ABCs) are another policy intervention aiming to shift external factors such as individual written **commitments and social norms** in driving behavioral change. In this policy, written agreements between a young person, the local housing office or Registered Social Landlord and the local police in which the person agrees not to carry out a series of identifiable anti-social behaviors. The key differences are that ABCs do not require either party to sign the agreement and they are not legally binding. However, the breach of a contract could trigger the start of eviction proceedings or proceedings to issue an ASBO. Data for the 95 children placed on ABCs between 1999 to 2001 in Islington found that for the first six months of the contract, significantly fewer of came to attention for anti-social behaviour than in the previous six months (43% compared with 63% prior to contract). The overall number of antisocial acts committed more than halved (from 164 to 80)¹¹⁷.

Community Participation

Postal Voting

The British Election Survey found that if a person believes that his or her **peers** think that voting is a waste of time, that person is less likely to vote. Authorities initially thought that postal votes would act as a facilitating condition to promote voting. However, when optional postal voting was introduced in Switzerland, the number of voter did not increase. Interestingly, voter turnout actually decreased in smaller communities. A possible explanation is that the social norm of being seen voting was lost.

Voter Choice and Turnout

A randomized field experiment¹¹⁸ with 30,000 voters in the USA was conducted to see how voter turnout might be increased. The effectiveness of leaflets, telephone campaigns and face-to-face reminders of a forthcoming election, all using a non-party political message highlighting the importance of voting, were compared. Leaflets were found to have a modest effect (increase turnout by around 2.5%), telephone calls were found to have a slight negative effect and the face-to-face contact was found to have a highly significant effect (increasing turnout by around 10 to 15%). This meant that despite its relatively high cost, face-to-face contact was ultimately highly cost-effective relative to other means of boosting turnout. The evaluation design by this study is credible, using randomized intervention on a large sample.

Environment

¹¹⁷ K. Bullock and B. Jones (2004)

¹¹⁸ A.S. Gerber and D.P Green, (2000).

'Bin it to win it' and 'Stalking Litter'

In response to the growing issue of littering, London Borough of Southwark designed two campaigns. 'Bin it to win it' was a lottery where contestant simply had to throw their litter into litter bins to enter the contest. 'Stalking Litter' was a campaign where actors wearing giant litter costumes would create scenes in the street to attract attention and engage with public, as shown in the figure below. Both approaches were designed to raise awareness to the make problem by using **salience**. It appears that citizen satisfaction on the street cleanliness increased¹¹⁹.



Deposit Scheme for Recycling and Reverse Vending Machines

Deposit schemes are used to encourage people to return empty packaging, and there is evidence they can reduce littering¹²⁰. The principle of the scheme is that consumers pay an additional fee, like a deposit, to the retailer when purchasing a bottle or packaging. The deposit is refunded, either in cash or voucher, when the consumer returns the empty packaging. The current deposit for IrnBru is 30p, and 70% of bottles are returned for cleaning and reuse¹²¹.

Reverse Vending Machines are devices that accept empty containers and can return money to the user. An additional voucher has been offered as an incentive for people to recycle

¹¹⁹ Southwark programme,

http://www.southwark.gov.uk/info/10111/environmental_campaigns_and_education/569/bin_it_to_win_it

¹²⁰ D. McKenzie-Mohr, W. Smith and W.A. Smith. (1999)

¹²¹ AG BARR, Annual Report 2007,

[http://www.agbarr.co.uk//agbarr/newsite//ces_docstore.nsf/wpg/C7B3049D6CEA9D378025741800447930/\\$file/agb_annual_report.pdf](http://www.agbarr.co.uk//agbarr/newsite//ces_docstore.nsf/wpg/C7B3049D6CEA9D378025741800447930/$file/agb_annual_report.pdf)

using these machines. These financial incentives exploit the **loss aversion** of consumers. Evaluation based on the experience of other countries using these schemes showed that they increase return rates and that they may also help the reduction in littering. However, DEFRA believed that there are other ways to achieve similar results at less cost¹²².

Ecoteams

The EcoTeams programme is designed to help households make improvements in respect of their waste, water use, transport, energy consumption and shopping behaviors. Global Action Plan has been running the EcoTeams programme in various UK communities since 2002. Over a four to six month period, households monitor the environmental impact of their everyday lives. There are monthly meetings with other participants (6-8 households) during which they compare their domestic environmental impact, discuss how to reduce it and encourage each other to improve their environmental performance. **Group meetings**, in which like minded households meet, were either led by a trained facilitator or by the participants themselves. It was found that group meetings without trained facilitator were successful and sometimes worked better than with a facilitator. This could reveal the importance of **feeling engaged** and **group learning**. Through altering social norms and information dissemination in social networks, the project achieved on average 27% reduction in residual waste, 22% increase in recycling, 28% reduction in electricity usage and 20% reduction in gas usage¹²³. The more detailed figures are given in the table below.

The key concern for this type of evaluation is that it is based on individuals that choose to opt-in or **self-select** into such ecoteams. These might be the most motivated individuals to begin with. Hence such evaluations can overstate the potential benefits of these programs were they to be **scaled-up** and offered to less enthusiastic households.

Global Action Plan UK – Eco Teams Data¹²⁴

	Change	EcoTeams (N=58 teams)
Municipal Solid Waste	Max	- 46.90%
	Min	+ 23.93%
	Average	- 19.66%
Recycling	Average Proportion of Recycling	+ 7.71%
Electricity	Max	- 40.64%
	Min	+ 57.69%
	Average	- 6.86%

¹²² Department for Environment, Food and Rural Affairs (2008), Review of Packaging Deposits Systems for the UK.

¹²³ Idem.

¹²⁴ M. Nye and J. Burgess. (2008).

Beddington Zero Energy Development

The Beddington Zero Energy Development is a sustainable community in the UK designed to facilitate pro-environmental behaviour. The project transformed a former sewerage work site into an environmentally friendly, energy efficient environment. The project initiated by BioRegional and BDa ZEDfactory, and developed by the Peabody Trust, was completed in 2002. It solves problems such as heating and water usage, offers green transport plan and uses natural, renewable or recycled building materials.

Compared to local average, it achieved 81% reduction in energy use for heating, 45% reduction in electricity use and 58% reduction in water use. Compared to national average, there has been 64% reduction in car mileage. Finally 60% waste is recycled and 86% of residents buy organic food.¹²⁵

Health

STD and AIDS

Thailand has managed to dramatically transform sexual behaviors to reduce the transmission of AIDS and other sexually transmitted diseases. This was achieved by a sustained, multilevel attempt to change **social norms** concerning condom use. The campaign combined consultation with national **information campaigns**, active **engagement** of at-risk groups, severe **penalties** for brothels not following safe practices, and practices that empowered prostitutes to be able to insist on condom use. But perhaps the most important aspect of the programme was how the **parallel application** of all these elements created a sense that habits were changing and fostered the emergence of new social norms.¹²⁶ This is a good example of the type of coordinated policy interventions helping to reinforce the effect of each individual policy.

'Get Braids Not Aids'

'Get Braids Not Aids' is a campaign launched by DFID in Zimbabwe. The scheme trains hairdressers in low-income areas in informing their clients of the benefits of female condoms, how they are used and how to introduce them into a relationship. The information is thus being provided by a familiar person., and through agents that lie at the heart of community social networks. In 2005, the campaign had a network of 1,000 hair dressers in 500 salons, which sold over half of total sales of female condoms in Zimbabwe.

¹²⁵ <http://www.bioregional.com/what-we-do/our-work/bedzed/>

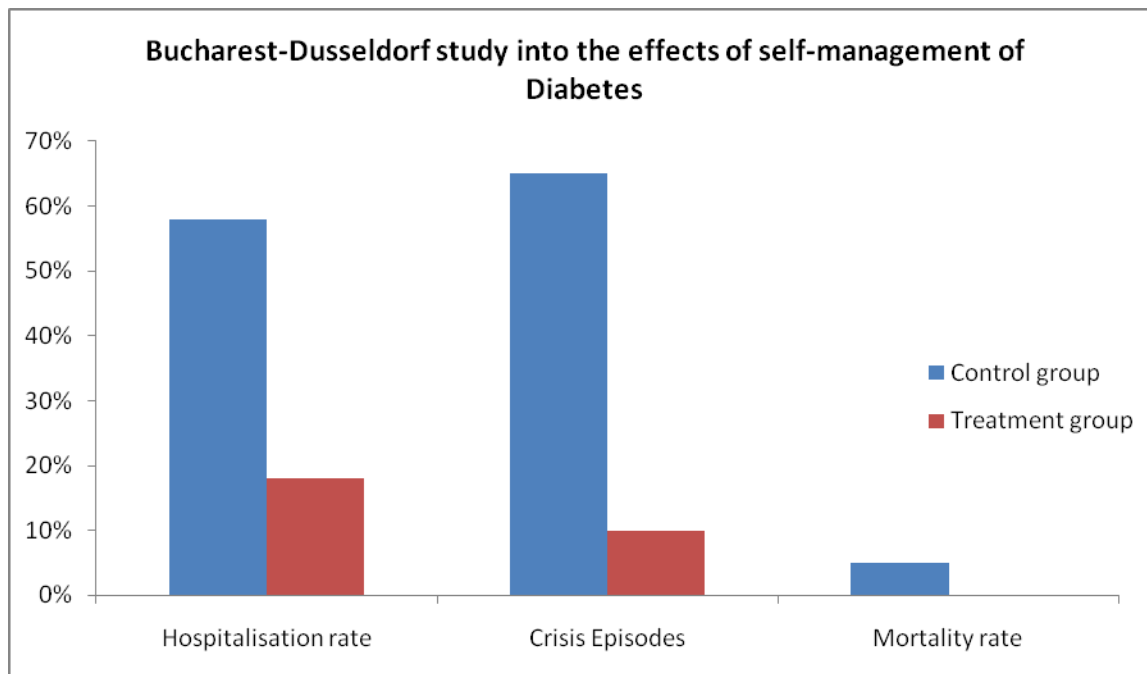
BioRegional, a charity that works to develop practical local sustainability projects led the development of the project and the Peabody Trust brought a long-term commitment to innovation in construction, quality accommodation and strong communities;

¹²⁶ G. Hart, MRC Social & Public Health Sciences Unit.

A study found that amongst 400 hair salons clients who had seen a female condom demonstration by a hairdresser were 2.5 times more likely to use the product than those who had not¹²⁷.

Self-management of Diabetes

The Bucharest-Dusseldorf study looks at the impact of behavior change programme in health care. This programme was evaluated using a randomized field experiment methodology. A control group was given conventional diabetes cares while the treatment group participated in an intensive programme of monitoring and self-management technique. The treatment group was found to have significant lower rates of medical crises and hospitalizations¹²⁸. The figure below gives an indication of the magnitude of the causal impact of the policy on three health related outcomes.



¹²⁷ D. Hales, K. Attawell, J. Hayman and N. Khan. (2004)

¹²⁸ D. Halpern, C. Bates, G. Beales, and A. Heathfield. (2004)

9. CASE STUDY: TACKLING OBESITY

16. Examine:

- a. the latest developments in the evidence-base in relation to changing eating and physical activity behaviour;
 - b. who are the most effective agents for the delivery of behaviour interventions to tackle obesity;
 - c. how current behaviour change interventions tackle obesity and what use is made of available scientific evidence;
 - d. whether such interventions are appropriately designed and evaluated;
 - e. what lessons have been learnt and applied as a result of the evaluation process.
-

Much attention has focused on obesity, its health risks and its burden to society. Prevalence of obesity has risen rapidly in Britain from less than 10% in the 1980s to over 20% today¹²⁹. Asymmetric paternalistic interventions attempt to shift behavior in self-interested directions of "unhealthy" individuals without harming "healthy" individuals¹³⁰. Numerous papers attempt to identify the contributing factors of obesity in order to find potential points of interventions. Interventions have in turn been evaluated through controlled experiments. We focus on a few studies here. In the Appendix tables we provide a more comprehensive survey of the available evidence on behavioral change – using a variety of research design - related to obesity.

Sedentary Habits

There are many experimental studies which support theories regarding the contributions of sedentary behaviour to weight status. Television watching has been the main focus for many studies as it is associated with overweight¹³¹ through decreased physical activity¹³² and unhealthy dietary behaviour¹³³.

¹²⁹ Health Survey for England 2001 (22%); Central Health Monitoring Unit, Department of Health 1986-7 (9.5%).

¹³⁰ T. Brennan G. Loewenstein and K.G Volpp. (2007)

¹³¹ J. Utter, D. Neumark-Sztainer, R. Jeffery, and M. Story. (2003)
S. Gable, Y. Chang, and J.L. Krull. (2007)

¹³² R. Lowry, H. Wechsler, D.A. Galuska, J.E. Fulton, and L. Kann. (2002) analyzed data from the 1999 national Youth Risk Behavior Survey, a representative sample of 15349 US high school students. TV viewing on an average school day exceeded 2 hours/day among 43% of students; it was greater among Black (74%) and Hispanic (52%) than White (34%) students. Overall, 11% of students were overweight, 31% of students were sedentary (i.e., did not participate in moderate or vigorous physical activity at recommended levels), and 76% ate less than five servings/day of fruits and vegetables. Watching TV more than 2 hours/day was associated

Anti-obesity measures need to address television watching, a major sedentary behavior as well as one that exposes viewers to countless high calorie advertisements. It has been estimated that a ban on these advertisements in the United States would reduce the number of overweight children ages 3-11 in a fixed population by 10 per cent and would reduce the number of overweight adolescents ages 12-18 by 12%¹³⁴.

Reducing television viewing and computer use can play an important role in preventing obesity. During a two year experiment, seventy children aged 4 to 7 years whose BMI was at or above the 75th BMI percentile for age and sex were randomized to an intervention to reduce their television viewing and computer use by 50% versus a monitoring control group that did not reduce television viewing or computer use. Children randomized to the intervention group showed greater reductions in targeted sedentary behavior, BMI, and energy intake compared with the monitoring control group¹³⁵. However, some argue that television advertising, rather than viewing per se, is associated with obesity¹³⁶.

Until now, most weight loss programmes offered rewards for those who succeeded in losing weight. Unfortunately, this financial method has not reached long term maintenance of weight loss¹³⁷. An alternative approach could use our **loss aversion** as an incentive for weight loss. One study asked some participants to deposit money into an account, which was returned to them if they met weight loss goals. After seven months, this group showed significant weight loss compared to the control group¹³⁸.

Commitment strategies have significantly increase success of programmes designed to increase physical exercise. For example, B.R. Williams, J. Bezner, S.B. Chesbro, and R. Leavitt.

with being overweight, being sedentary, and eating insufficient fruits and vegetables among White females, and with being overweight among Hispanic females.

¹³⁴ S.Y. Chou, I. Rashad, and M. Grossman. (2008).

¹³⁵ L.H. Epstein, J.N. Roemmich, J.L. Robinson, R.A. Paluch, D.D. Winiewicz, J.H. Fuerch, and T.N. Robinson. (2008).

¹³⁶ F.J. Zimmerman and J.F. Bell (2010)

J.L. Wiecha, K.E. Peterson, D.S. Ludwig, J. Kim, A. Sobol and S.L. Gortmaker (2006).

¹³⁷ Paul-Ebhohimhen and A. Avenell. (2008).

¹³⁸ K.G. Volpp, L.K. John, A.B. Troxel, L. Norton, J. Fassbender, and G. Loewenstein. (2008) conduct a randomized study on fifty-seven healthy participants aged 30-70 years with a body mass index of 30-40, well above the national average. Participants were randomized to 3 weight loss plans: monthly weigh-ins, a lottery incentive program, or a deposit contract that allowed for participant matching, with a weight loss goal of 1 lb (0.45 kg) a week for 16 weeks. The incentive groups lost significantly more weight than the control group (mean, 3.9 lb). Compared with the control group, the lottery group lost a mean of 13.1 lb and the deposit contract group lost a mean of 14.0 lb. Although the net weight loss between enrollment in the study and at the end of 7 months was larger in the incentive groups (9.2 lb) than in the control group (4.4 lb), these differences were not statistically significant. However, incentive participants weighed significantly less at 7 months than at the study start whereas controls did not.

(2005) report findings from their study on 43 postmenopausal African American women who were randomly assigned to an experimental or control group. Those in the experimental group signed a behavioral contract. A pedometer, daily log, 7-day physical activity recall, and qualitative analysis were used during a 7-week program. The contract group adhered more to the brisk walking goal ($P = .006$). A behavioral contract is effective in increasing exercise adherence in postmenopausal African American women.

Eating Habits

The dietary patterns of children from families in which television viewing is a normal part of meal routines may include fewer fruits and vegetables and more pizzas, snack foods, and sodas than the dietary patterns of children from families in which television viewing and eating are separate activities¹³⁹. Fast food consumption and breakfast skipping increased during the transition to adulthood, and both dietary behaviors are associated with increased weight gain from adolescence to adulthood. These behaviors may be appropriate targets for intervention during this important transition¹⁴⁰.

The rise in obesity rate over the past 30 years has been paralleled by the increases in portion sizes and the prevalence of eating away from home¹⁴¹. Many studies have shown that portion size has a direct impact on obesity¹⁴². American health authorities have recognized the impact of portions on obesity and are calling for portion size reductions. However, fast-food portions in the United States are still larger than in Europe¹⁴³. Comparison between customers who purchase standard portion and those who purchase the larger size increase their energy intake of the entire meal by 25%¹⁴⁴.

¹³⁹ K.A. Coon, J. Goldberg, B.L. Rogers, and K.L. Tucker. (2001) find that children from families with high television use derived, on average, 6% more of their total daily energy intake from meats; 5% more from pizza, salty snacks, and soda; and nearly 5% less of their energy intake from fruits, vegetables, and juices than did children from families with low television use. Of course, in this non experimental framework, there is no causal link established to television use. For example there might be some common factor that determines household's television usage and the diet composition.

¹⁴⁰ H.M. Niemeier, H.A. Raynor, E.E. Lloyd-Richardson, M.L. Rogers, and R.R. Wing. (2006). report findings based on 9919 adolescents participating in Waves II (age range 11–21 years) and III (age range 18–27 years) of the National Longitudinal Study of Adolescent Health were monitored. Marked increases in fast food consumption and decreases in breakfast consumption occurred over the 5-year interval. Greater days of fast food consumption at WaveII predicted increased BMI at WaveIII. Fewer days of breakfast consumption at Wave II and decreases in breakfast consumption between WavesII and III predicted increased BMI at WaveIII.

¹⁴¹ J.H. Ledikwe, J.A. Ello-Martin, and B.J. Rolls. (2005)

¹⁴² L.R. Young and M. Nestle, (2002)

¹⁴³ L.R. Young and M. Nestle (2007)

¹⁴⁴ N. Diliberti, P.L. Bordi, M.T. Conklin, L.S. Roe, and B.J. Rolls. (2004) report findings based on 180 adult customers that were monitored. Portion size had a significant effect on intake of the entrée ($p < 0.0001$). Compared with customers who purchased the standard portion, those who purchased the larger portion increased their energy intake of the entrée by 43% (719 kJ; 172 kcal) and of the entire meal by 25% (664 kJ; 159 kcal). There was no difference between the two groups of customers in ratings of the appropriateness of the portion size or of the amount that was eaten in relation to their usual meal.

Healthy default schemes appear to give the right “nudge” without restricting the freedom of choice of customers. Setting a healthy default meal with the option of changing for a less healthy meal has been evaluated. In the school setting, it has shown some success. The Eat Smart intervention was conducted in 56 intervention schools over a 2-year period. Five consecutive days of school menu, recipe, and vendor product information were collected from intervention and control schools to assess the nutrient content of school menus as offered. There was a significantly greater mean reduction in the percentage of calories from total fat and saturated fat in intervention compared with control schools from baseline to follow-up. Average total calories decreased significantly; however, the mean total calories (683 kcal) for intervention schools remained above one-third of the Recommended Dietary Allowances for this age group¹⁴⁵.

Fast food and soft drinks have been blamed for much of the rise in obesity. Consequently, adjusting their **relative price** and **availability** has been considered. Many countries already apply sales tax to particular items but not others with health concern in mind. In France for instance, sweets, chocolates, margarine and vegetable fat attract VAT of 20.6% whilst other foods attract VAT of only 5.5%¹⁴⁶. Evidences on introducing higher prices have mix results on people’s consumption behaviour. Some researchers have shown that taxes on soft drinks have little impact on population weight¹⁴⁷ and taxes on food-away from home could actually increase body weight¹⁴⁸. A more positive result can be found in an experiment on the prices of items sold in vending machines. Prices of the low-fat goods were reduced by 50% for three weeks and sales were recorded before and after this trial. Whilst total snack sales did not change, the percentage of total sales that were low-fat goods rose from 25.7% to 45.8%, but afterwards, the percentage fell back again to 22.8%, suggesting that it was the price that was the key factor.¹⁴⁹

Assistance and support can help those trying to lose weight easier. Adding e-mail counseling to a basic Internet weight loss intervention program proved to significantly improve weight loss in adults at risk of diabetes¹⁵⁰.

¹⁴⁵ S.K. Osganian, M.K. Ebzery, D.H. Montgomery, T.A. Nicklas, M.A. Evans, P.D. Mitchell, L.A. Lytle, M.P. Snyder, E.J. Stone, M.M. Zive (1996).

¹⁴⁶ A. Leicester and F. Windmeijer (2004).

¹⁴⁷ J.M. Fletcher, D. Frisvold, and N. Tefft. (2010).

¹⁴⁸ C. Schroeter, J. Lusk and W. Tyner, (2008)

¹⁴⁹ S.A. French, R.W. Jeffery, M. Story, P. Hannan and P. Snyder (1997)

¹⁵⁰ D.F. Tate, E.H. Jackvony and R.R. Wing, (2003) conducted a single-center one-year randomized controlled trial on 92 overweight adults whose mean age was 48.5 years and body mass index, 33.1. Participants were randomized to a basic Internet (n = 46) or to an Internet plus behavioral e-counseling program (n = 46). Both groups received one face-to-face counseling session. Intent-to-treat analyses showed the behavioral e-counseling group lost more mean weight at 12 months than the basic Internet group, and had greater decreases in percentage of initial body weight, body mass index, and waist circumference.

Social Environment

Social origin, rather than adult life socio-economic position, may play an important role in the development of obesity¹⁵¹. Many researches concur that physical attributes of the home environment and parental behaviour are associated with physical activity and dietary behaviour¹⁵². Parents' education could help prevent obesity developing at an early age. A parent led intervention involving daily tasting of a vegetable holds promise for improving children's acceptance of vegetable.

Although social network shape our behaviour (for tobacco and alcohol consumption¹⁵³), researches have shown that it has practically no impact on our probability to be overweight¹⁵⁴.

Environment on a larger scale seems to impact our obesity rate. Inverse associations were observed between obesity and variables such as economic (real domestic product), food, urbanization, transport (passenger car, gasoline price, motorways) and policy (governance)¹⁵⁵. Technological changes such as new food technology and processed food can produce obesity¹⁵⁶. Variables such as the per capita number of fast food restaurant, the per capita number of full-service restaurants, the price of a meal in each type of restaurant, the price of food consumed at home, the price of cigarettes, clean indoor air laws, hours of work per week and hourly wage rates have all shown the expected effects on obesity rates¹⁵⁷.

Contextual Factors

The location and the provision of local supermarkets play an important role in dietary intakes¹⁵⁸. Therefore, measures such as **financial incentives** or **regulation on access** can be taken to modify these factors. Favoring healthy food through discounted price in

¹⁵¹ M. Okasha, P. McCarron, J. McEwen, J. Durnin, and G. Davey Smith. (2003)

¹⁵² N.J. Spurrier, A.A. Magarey, R. Golley, F. Curnow, and M.G. Sawyer. (2008) conduct a study in which information via direct observation and interviews were taken from 280 preschool children. Parental physical activity, size of backyard and amount of outdoor play equipment were associated with more outdoor play. Fewer rules about television viewing and presence of a Playstation were associated with more indoor sedentary time. Lower fruit and vegetable intake was associated with reminding child to 'eat up' and offering food rewards to eat main meal. The availability of food groups in the home was associated with children's intake of these foods.

¹⁵³ J. Fletcher and Ross S.L. (2010)

¹⁵⁴ E. Cohen-Cole and J.M. Fletcher, (2008)

¹⁵⁵ T.K Boehmer M. Rabin and R.C. Brownson. (2007)

¹⁵⁶ D. Lakdawalla, T. Philipson, and J. Bhattacharya. (2005)

D.M. Cutler, E.L. Glaeser and J.M. Shapiro. (2003)

¹⁵⁷ S.Y. Chou, M. Grossman, and H. Saffer. (2004)

¹⁵⁸ K. Morland, S. Wing, and A.D. Roux. (2002).

J.N. Bodor, D. Rose, T.A. Farley, C. Swalm, and S.K. Scott. (2007)

supermarkets has had significant and sustained effects on food purchase¹⁵⁹. Reducing access to soft drinks in schools has also been unsuccessful in reducing consumption¹⁶⁰. Policies restricting access to fast food near school on the other hand show promising results on obesity among children¹⁶¹.

Information and Education

Knowledge is inversely related to the probability that an individual is obese. Schooling's effects on relative weight and the probability of being obese are explained by differences in knowledge. The result also may imply that the most effective method of health education is to highlight the disease element of poor dietary habits and health¹⁶². Moreover, education is an important determinant in the decision to use preventive care. Increasing education alone could have potentially spill-over on long-term health choices¹⁶³. It has also been demonstrated that there exists a relationship between risk knowledge and obesity¹⁶⁴.

Advertisement of poor nutritional food has been shown to be a determining factor in the link between television and overweight. Adolescents are primary targets of advertising for fast food restaurants, snack foods, and sugar-sweetened beverages, which may influence their food choices¹⁶⁵. This is evidence that television viewing through advertisements may have long-term effects on eating choices and contribute to poor eating habits in young adulthood¹⁶⁶. Soft drink advertising is related to increased consumption of soft drinks among elementary school children¹⁶⁷.

Educational programs have been tested in different environment. At a school-level, there have been positive results on the consumption of fruits, vegetable and juices¹⁶⁸, fat intake¹⁶⁹ and overall diet¹⁷⁰. Unfortunately, despite initial success in behavior change, there are ambiguous results on the long term behavioral changes in school-based interventions¹⁷¹. Worksite educational interventions have had mixed results. Some have shown little effects

¹⁵⁹ C. Ni Mhurchu, T. Blakely, Y. Jiang, H.C. Eyles, and A. Rodgers. (2010)

¹⁶⁰ S.NE. Visit. (2008)

¹⁶¹ J. Currie, S. DellaVigna, E. Moretti, and V. Pathania. (2009).

¹⁶² R.M. Nayga. (2000) and R.M. Nayga (2001)

¹⁶³ J.M. Fletcher and D.E. Frisvold. (2009)

¹⁶⁴ K. Kan and W.D. Tsai. (2004)

¹⁶⁵ L.M. Powell, G. Szczypka, F.J. Chaloupka, and C.L. Braunschweig. (2007).

¹⁶⁶ D.J. Barr-Anderson, N.I. Larson, M.C. Nelson, D. Neumark-Sztainer, and M. Story. (2009).

¹⁶⁷ T. Andreyeva and I. Rashad Kelly. (2010).

¹⁶⁸ T. Baranowski, M. Davis, K. Resnicow, J. Baranowski, C. Doyle, L.S. Lin, M. Smith, and D.T. Wang. (2000).

¹⁶⁹ B. Caballero, T. Clay, S.M. Davis, B. Ethelbah, B.H. Rock, T. Lohman, J. Norman, M. Story, E.J. Stone, L. Stephenson. (2003).

¹⁷⁰ T.M. Harwood. (2009).

S.L. Gortmaker, K. Peterson, J. Wiecha, A.M. Sobol, S. Dixit, M.K. Fox, and N. Laird. (1999)

¹⁷¹ N. Rodriguez-Planas, (2010).

in changing behaviors¹⁷² while others have been successful in delivering the message¹⁷³ or effectively changing diet¹⁷⁴. Finally, mass media health education in communities has been undertaken and has been effective in targeted groups¹⁷⁵. Even though some results have been modest, taken together these trials have demonstrated the feasibility of activating schools, work-sites and entire communities in pursuit of healthier citizens. Children should be the priority population for interventions¹⁷⁶.

¹⁷² R.E. Glasgow, J.R. Terborg, L.A. Strycker, S.M. Boles, and J.F. Hollis. (1997).

¹⁷³ M.K. Hunt, R. Lederman, S. Potter, A. Stoddard, and G. Sorensen. (2000).

¹⁷⁴ G. Sorensen, A. Stoddard, K. Peterson, N. Cohen, MK Hunt, E. Stein, R. Palombo, and R. Lederman. (1999).

¹⁷⁵ R.V. Luepker, DM Murray, DR Jacobs Jr, MB Mittelmark, N. Bracht, R. Carlaw, R. Crow, P. Elmer, J. Finnegan, and AR Folsom. (1994).

¹⁷⁶ II Baum, L. Charles, and C.J. Ruhm. (2009). Age, socioeconomic status and obesity growth. *Journal of health economics*, 28(3):635-648

10. APPENDIX: THEORIES OF ADDICTIVE BEHAVIOR¹⁷⁷

THEORIES	MODELS	REFERENCES
Choice Theories	Becker's Rational Addiction Theory Skog's Choice Theory Expectancies Judgement relating feelings Attentional biases Economic Theory	Becker and Murphy, 1988 Skog, 2000 Brown, Christiansen et al., 1987 Slovic, 2002 Mogg, Field et al., 2005 Bickel, DeGrandpre et al., 1995
Compulsion and Self-Control Theories	Disease Model Theory of Inhibition Dyregulation Failure of self regulation Cognitive model of craving	Jellinek, 1960 Lubman, Yucel et al., 2004 Baumeister, 1994 Tiffany and Drobes, 1991
Drug Transitions Theories	Gateway Theory	Kandel, Yamaguchi et al., 1992
Recovery Theories	Transtheoretical Model of Stages of Change Model Social Learning Theory Transition from lapse to relapse	Prochaska and Velicer, 1997 Bandura, 1977 Marlatt and George, 1984
Theories focusing on the addict	Sense of identity Psychological problems Theory of personality Habit Opponent Process Theory Addiction as reward Cravings and dependence Dose escalation and maintenance	Kearney and O'Sullivan, 2003 Gelkopf, Levitt et al., 2002 Cloninger, 1987 O'Brien, Childress et al., 1992 Solomon and Corbit, 1973 Wise and Bozarth, 1987; Koob and Nestler, 1997; Weiss and Koob, 1996 Melchior and Tabakoff, 1984 Lewis, 1990; Schulteis and Koob, 1996
Population Level Theory	Diffusion Population Trends	Ferrence, 2001 Agar and Reisinger, 2002
Integrated Theories	Excessive Appetites' Theory Model of pathological gambling	Orford, 2001 Blaszczynski and Nower, 2002
Synthetic Theory of Motivation	PRIME (plans, responses, impulses, motives and evaluations)	West, 2006

¹⁷⁷ R. West (2006)

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ISSUE	PAPERS	METHOD	RESULT
I. Building a case for action on obesity			
Alarming trends	Schwimmer et al. (2003)	Self-report	Obese children and adolescents have lower health-related quality of life than children and adolescents who are healthy and similar quality of life as those diagnosed as having cancer.
Quality of life	Gable et al. (2008)		Overweight seems to precede academic difficulties. Overweight children progress less than their non-overweight peers in reading and math.
Academic difficulties	Strauss and Pollack (2003)	Observational	Many overweight adolescents are socially marginalized, which may aggravate the social and emotional consequences of overweight in this age group.
Isolation	Goldman (2008)	Simulation	Sustained increases in obesity, diabetes and other diseases could reduce life expectancy with a concomitant decrease in the annuity burden but these savings may be offset by increases in health care spending and public assistance and reductions in labor supply.
Cost for society			
II. Identifying points of intervention			
Education	Webbink et al. (2009)	Experimental	The estimated effect of education on overweight status increases with age. For identical twin men, education reduces the probability of being overweight. For identical twin sisters, peer effects rather than education might play a role.
	Fletcher and Frisvold (2009)	Observational	Education, through occupational channel and access to care, is associated with an approximately 5–15% increase in the likelihood of using several types of preventive care. Increase in education have the potential to spill-over onto long-term health choices.
	Nayga (2000)	Observational	Schooling's effects on relative weight and the probability of being obese are explained by differences in knowledge.
	Nayga (2001)	Observational	Schooling has a negative effect on the odds that a man or woman is obese, while health knowledge has a negative effect on the odds that a woman is obese.
	Kan and Tsai (2004)	Survey	There exist a relationship between risk knowledge and obesity and it is different for males and females.
Risk preference	Anderson and Mellor (2008)	Experimental and survey	Controlling for subject demographic and economic characteristics, risk aversion is negatively and significantly associated with the likelihood of engaging in risky behaviours (smoking, drinking, being overweight and seatbelt non-use).
Social networks	Fletcher and Ross (2010)	Survey	Friendship network effects are important in determining adolescent tobacco and alcohol use but endogeneity of friendship selection should be taken into account.
	Cohen-Cole and Fletcher(2008)	Observational	Estimates of “social network effect” are reduced and become statistically zero once standard econometric techniques are implemented.

Environment			
Family background and environment	Okasha et al. (2003)	Survey	Social origins, rather than adult life socioeconomic position, may play an important part in the development of adult overweight and obesity.
	Baum et al. (2009)	Observational	Weight increases with age and is inversely related to socio-economic status during childhood.
	Spurrier et al. (2008)	Self-report	Physical attributes of the home environment and parental behaviours are associated with preschool children's physical activity, sedentary behaviour and dietary patterns.
	Kremers et al. (2007)	Self-report	Habit and parental norms play a role in sedentary behaviour and consumption of sugar-sweetened beverages among adolescents.
	Kremers et al. (2003)	Self-report	Children of parents with indulgent parenting styles consumed more fruit than adolescents from authoritarian or neglectful homes.
	Cooke (2007)	Literature review	Large increases in liking and intake of raw red pepper were seen in 5- to 7-year olds when mothers used exposure techniques to increase children's acceptance of vegetables, achieved similar results.
	Birch and Fisher (2000)	Observational	Child-specific aspects of the family environment, including mothers' child feeding practices and perceptions of their risk of overweight, predict maternal child-feeding practices, which then predict daughters' eating and relative weight.
	Anderson et al. (2003)	Survey	Child is more likely to be overweight if his/her mother worked more hours per week over the child's life.
	Johannsen et al. (2006)	Self-report	Children's weight was related to mothers' BMI, but not fathers'. Girls had a greater BMI if either parent reported being overweight as a child, and both girls and boys were likely to be overweight if their mothers believed they had risky eating habits. Girls with more controlling fathers had a higher percentage fat
Government policy	Rabin et al. (2007)	EU survey	The obesity prevalence varied widely across countries and between genders with higher values in Central and Eastern European countries and lower values in France, Italy, and some Scandinavian countries. Statistically significant inverse associations were observed between obesity and variables such as economic (real domestic product), food (available fat), urbanization (urban population), transport (passenger cars, price of gasoline, motorways), and policy (governance). The magnitude of the coefficients suggests stronger associations for female obesity than for male obesity in all cases.
Welfare-enhancing technology change	Lakdawalla et al. (2005)	monitoring: sur	Technological change can produce obesity as an unintended consequence of economic development, which reduces food prices and work strenuousness

	Cutler et al. (2003)	Observational	Obesity across countries is correlated with access to new food technologies and to processed food.
	Chou et al. (2004)	Observational	Repeated cross sections are augmented with state level per capita number of fast food restaurants, the per capita number of full-service restaurants, the price of a meal in each type of restaurant, the price of food consumed at home, the price of cigarettes, clean indoor air laws, hours of work per week and hourly wage rates by age, gender, race, years of formal schooling complete and marital status. These variables have the expected effects on obesity.
Price			
Food price	Gelbach et al. (2007)	Observational	Results suggest that variation in year-to-year food prices is unlikely to explain much of the increase in body weight over our sample period.
	Powell (2009)	Observational	The price of fast food but not the availability of fast food restaurants has a statistically significant effect on teen BMI with an estimated price elasticity of -0.08. There is evidence that the weight of teens in low- to middle-socioeconomic status families is most sensitive to fast food prices.
	Griffith and Nesheim (2008)		Willingness to pay for organic food vary with quality, health concerns and environmental concerns.
Habit			
Eating while watching TV	Matheson et al. (2004)	Experimental	This research revealed that a significant proportion of African-American girls' daily energy intake is consumed while watching television.
	Coon et al. (2001)	Observational	The dietary patterns of children from families in which television viewing is a normal part of meal routines may include fewer fruits and vegetables and more "junk food" than the dietary patterns of children from families in which television viewing and eating are separate activities
	Blass et al. (2006)	Experimental	Watching television increases the intake of high-density, palatable, familiar foods and may contribute to the current obesity crisis.
Fast food consumption	Niemeier et al. (2006)	Survey	Fast food consumption and breakfast skipping increased during the transition to adulthood, and both dietary behaviors are associated with increased weight gain from adolescence to adulthood.
TV viewing	Lowry et al. (2002)	monitoring: sur	Watching TV more than 2 hours/day is associated with being overweight, being sedentary, and eating insufficient fruits and vegetables among White males and females, and with being overweight among Hispanic females. No significant associations were found among Black females and Hispanic males. Among Black males, TV viewing was associated with greater physical activity.

Sedentary behaviour	Gable et al. (2007)	Experimental	Television watching, family meals, and neighborhood safety contribute to childhood weight status.
	Utter et al. (2003)	monitoring: sur	Messages aimed at reducing time spent in sedentary activities should be targeted at television/video use instead of time spent reading, doing homework, or using a computer. Nutrition education should incorporate messages about the influence of the media and advertising on dietary behaviors.
Food portions	Young and Nestle (2002) Diliberti et al. (2004)	Observational Experimental	Food portions have increased in size and are associated to increasing weights. Compared with customers who purchased the standard portion, those who purchased the larger portion increased their energy intake of the entire meal by 25%. There was no difference between the two groups of customers in ratings of the appropriateness of portion size.
	Ledikwe et al. (2005)	Review of litera	The rise in obesity rates over the past 30 years has been paralleled by increases in the portion size of many foods and the prevalence of eating away from home.
Contextual Factors			
Group size	Bell and Pliner (2003)	Observational	An interaction between group size and eating setting indicate that the magnitude of the group size effect on meal duration differ in the different situations with
Package size, lighting, shape, variety	Wansink (2004)	Review of litera	Package size, plate shape, lighting, socializing, and variety are environmental factors that can influence the consumption volume by inhibiting consumption monitoring and by suggesting alternative consumption norms.
Advertising	Barr-Anderson et al. (2009)	observational	Television viewing in middle and high school predicted poorer dietary intake five years later.
	Andreyeva and Kelly (2010)	observational	Soft drink TV advertising is related to increased consumption of soft drinks among elementary school children. Mild effects of exposure to food TV advertising on body weight can be seen, but overall results from these analyses are inconclusive.
	Zimmerman and Bell (2010) Powell et al. (2007)	observational Observational	Television advertising, rather than viewing per se, is associated with obesity. The majority of food-product advertisements seen on television by American children and adolescents are of poor nutritional content.
Supermarket	Wiecha et a. (2006)	Experimental	Increases in television viewing are associated with increased calorie intake among youth. There is an increasing consumption of calorie-dense low-nutrient foods frequently advertised on television
	Morland et al. (2002) Bodor et al. (2007)	observational / experimental r	The local food environment is associated to reports of dietary recommendations. Small neighbourhood food stores play a role in fruit and vegetable intake.

III. Defining the range of opportunities for action			
Preventive strategies	Swinburn and Egger (2002)	informed opinion	
Public health	Nestle and Jacobson (2000)	informed opinion	
Policy consistency	Lang and Rayner (2007)	informed opinion	
EU	Lang and Rayner (2005)	informed opinion	
Regulating environment	Hayne et al. (2004)	informed opinion	
Link with Tobacco	Engelhard et al. (2009)		Tobacco policies could be applied to obesity prevention measures label, ban advertisement, taxes
International comparison	Jalbert et Mongeau (2006)	overview	
IV. Evaluating potential interventions			
Individual level			
Economic incentives	Volpp et al. (2008)	Randomized experiment	The use of economic incentives produced significant weight loss during the 16 weeks of intervention that was not fully sustained.
	Paul-Ebhohimhen et al. (2008)	review of randomized experimental	No significant effect of use of financial incentives on weight loss or maintenance at 12 months and 18 months
Internet counseling	Tate et al. (2003)	Randomized experiment	Adding e-mail counseling to a basic Internet weight loss intervention program significantly improved weight loss in adults at risk of diabetes
Reducing TV and computer use	Epstein et al. (2008)	Randomized experiment	Reducing television viewing and computer use can prevent obesity and lower BMI in young children, and these changes may be related more to changes in energy intake than to changes in physical activity.
Family			
Parents' education	Wardle et al. (2003)	Experimental	A parent-led, exposure-based intervention involving daily tasting of a vegetable holds promise for improving children's acceptance of vegetables.
School level			
Education	Baranowski et al. (2000)	randomised experiment	A school nutrition education program can help change children's fruit, juice and vegetable consumption and impact factors at home that predispose to their consumption, but changes were small, and their persistence is unknown.
	Caballero et al. (2003)	Randomized experiment	The educational program produced significant positive changes in fat intake and in food- and health-related knowledge and behaviors.
	Harwood (2009)	Experimental	Nutritional education has a significant impact on dietary intake.
	Gortmaker et al. (1999)	Randomized experiment	Planet Health program decreased obesity among female students.
	Rodríguez-Planas (2010)	Randomized experiment	An afterschool programme that offered disadvantaged high-school youth mentoring, educational services, financial rewards to attend program activities was unsuccessful at reducing risky behaviours.
Healthier lunches	Osganian et al. (1996)	Experimental	The CATCH Eat Smart intervention successfully lowered the total fat and

Reduced availability of sodas	Visit (2007)	non-randomized experiment	saturated fat content of school lunches as offered. Reducing availability of SSB (sugar sweetened beverages) in schools did not result in a greater decrease in SSB consumption as compared to control subjects.
Worksite			
Education	Glasgow et al. (1997)	non randomized experiment	Outcome and process results revealed consistent, but modest effects favoring intervention worksites on most measures. Cross-sectional analyses generally failed to produce statistically significant intervention effects, but cohort analyses revealed significant beneficial effects of the Take Heart II intervention on eating patterns, behavior change attempts, and perceived social support.
Employee involvement	Hunt et al. (2000)	randomized experiment	Smaller work-site size was associated with greater employee awareness of the program and greater participation in project activities as reported on the employee survey.
Work and/or family interventions	Sorensen et al. (1999)	randomised experiment	The worksite+family intervention was more successful in increasing fruit and vegetable consumption than was the worksite intervention.
Community			
Education	Luepker et al. (1994)	experimental	Many intervention components proved effective in targeted groups, but against a background of strong secular trends of increasing health promotion and declining risk factors, the overall program effects were modest in size and duration
	Chang and Just (2007)	Observational	Health information has a significant impact on US egg consumption. The reaction to health information is found to be temporary and become unimportant in a matter of weeks without a constant and consistent onfirming information.
Discount & education	Ni Mhurchu et al. (2010)	randomized exp	Discount prices influenced food purchased but education had no effect.
National			
Restricting access to fast food	Currie et al. (2009)	survey + match	Policies restricting access to fast food near schools could have significant effects on obesity among school children, but similar policies restricting the availability of fast food in residential areas are unlikely to have large effects on adults.
Smaller portions	Young and Nestle (2007)	Observational	Even while health authorities are calling for portion size reductions, fast-food portions in the US are larger than in Europe. Reduce portion sizes are unlikely to be effective.
Taxes on "fat food"	Fletcher et al. (2010) Schroeter et al. (2008) Kuchler et al. (2005) Leicester and Windmeijer (2005) French et al. (1997)	Effectiveness and monitoring: survey simulation experiment	The effects of soft drink taxes on population weight is small in magnitude. Tax on food away from home could lead to an increase in body weight. The impacts of taxes on dietary quality are small at the lower tax rates. Economic incentives for "fat taxes" and how they can be implemented Prices of fat food in vending machines can reduce their sales

Regulation on advertisement	Chou et al. (2008)	Effectiveness and	A ban on these advertisements would reduce the number of overweight children ages 3-11 in a fixed population by 10% and would reduce the number of overweight adolescents ages 12-18 by 12%. The elimination of the tax deductibility of advertising would produce smaller declines of 3-5% but would impose lower costs on children and adults who consume fast food in moderation because positive information about restaurants that supply this type of food would not be banned completely from television
Default option + food label	Downs et al. (2009)	Experimental	Providing calorie information may have small effects on food choices, but may also produce perverse effects, such as promoting higher calorie consumption among dieters.
Nutrition Labeling	Variyam and Cawley (2006)	difference-in-di	Among non-Hispanic white women, that the implementation of the new labels was associated with a decrease in body weight and the probability of obesity.
	Nayga Jr. (2000)		Nutrition knowledge does not have an effect on label use. Gender effects is mainly due to differences in nutrition knowledge levels.
	Loureiro et al. (2006)	observational	On average, the mean willingness to pay (WTP) for a box of cookies with a nutritional label is estimated to be about 11% above the price of the box of cookies without a nutritional label. A difference between the WTP of individuals suffering from diet-related health problems (estimated mean 13%) and those who do not suffer any diet-related health problems (estimated mean 9%).
	Kim et al. (2000) Burton et al. (2006)	survey + experi	Food label use decreases label users' average daily intakes of calories. Most consumers are unaware of the high levels of calories, fat, saturated fat, and sodium found in many menu items. Provision of nutrition information on restaurant menus could potentially have a positive impact on public health by reducing the consumption of less-healthy foods.