Understanding sustained behavior change: the role of life crises and the process of reinvention

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ABSTRACT   Much research has addressed behavior change but has tended to focus on short term changes. This study aimed to explore the mechanisms behind sustained changes in behavior and involved qualitative interviews with 34 'success stories' who had either lost weight through changes in diet and exercise ($n = 24$) or stopped smoking ($n = 10$) and had maintained this change for at least 3 years. The results showed that the majority described how their sustained behavior change had been triggered by a significant life crisis relating to their health, relationships or salient milestones. This initial change was then translated into sustained change if three sustaining conditions were met: the function of the unhealthy behavior was disrupted, the individual perceived that their choice over carrying out the unhealthy behavior had been reduced and they adhered to a behavioral model of their problem. Further, these conditions functioned by enabling a process of reinvention with participants showing a shift in identity toward a new healthier self. The results are discussed in terms of self-regulation and the establishment of a new post-crisis healthier equilibrium.

KEYWORDS   *behavior change; diet; maintenance; smoking; weight loss*

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Introduction

Health behaviors such as smoking, poor diet and a sedentary lifestyle can cause serious health problems and are associated with a range of cancers, diabetes, heart disease and mortality (Mokdad et al., 2004). They may also produce symptoms that can be detrimental to quality of life such as breathlessness, inactivity, joint trauma, lowered self-esteem and depression

(Doll and Peto, 1981; National Institutes of Health, 1998). In line with these health risks an increasing number of interventions have been developed to promote healthier lifestyles some of which have been derived from psychological theories of behavior and behavior change. Evaluation of such interventions indicates that successful behavior change is related to a range of factors including social class and gender, time since onset of unhealthy behavior, previous change attempts, type and intensity of the intervention, the individual's beliefs about the nature of their problem and the degree of support they receive from partners, peers and health professionals (NHS Centre for Reviews and Dissemination, 1997; Elfhag and Rossner, 2005; Finch et al., 2005; Wing and Phelan, 2005; West, 2006). In terms of weight loss maintenance, recent research has analyzed data from the National Weight Control Registry and highlighted a range of strategies used to promote weight loss in the longer term. The results from this analysis illustrate the importance of behaviors such as high levels of physical activity, eating low calorie, low fat diets, eating breakfast regularly, self-monitoring and main-taining a consistent eating pattern across weekdays and weekends. This research also illustrates how weight loss maintenance may become easier over time (Wing and Hill, 2001; Gorin et al., 2004b; Raynor et al., 2005; Wing and Phelan, 2005). From this perspective, research highlights which strategies are linked to longer term changes in behavior. The focus of this research, however, tends to be specific to particular behaviors and focuses on behavior per se rather than the cognitions behind these behaviors.

As a means to highlight the cognitions behind behavior change much research, particularly within health psychology, has focused on the application of social cognition models. For example, research has utilized the Health Belief Model (HBM, Becker and Rosenstock, 1987), and the Theory of Planned Behavior (TPB, Ajzen, 1985; Ajzen and Fishbein, 2005) to predict behaviors such as diet, exercise, weight loss and smoking cessation (see Conner and Norman, 2005 for a review). This approach highlights the importance of an individual's cognitions in predicting their subsequent behavior, and it also explores the extent to which such cognitions can pre-dict behavior change in the future. In contrast other research has drawn upon the Stages of Change Model (SOC, Prochaska and DiClemente, 1982). This perspective emphasizes behavior change as an ongoing process and describes a series of stages from pre-contemplation through to action and maintenance of this action and emphasizes how an individual's beliefs about the costs and benefits of their behavior change across these different stages.

Research has also used these theoretical perspectives as the framework for developing interventions to promote behavior change. At their most simple, interventions have included a role for implementation intentions which involves asking individuals to specify the 'what' and a 'when' of a particular behavior and has been shown to increase the likelihood of an intention being translated into behavior for performing breast self-examination (Orbell et al., 1997) and taking a vitamin C pill (Sheeran and

Orbell, 1999). Other interventions have also drawn upon social cognition models to design and assess the effectiveness of interventions to change behaviors such as drinking alcohol (Conner et al., 1999), safety helmet wearing in children (Quine et al., 1998) and cervical cancer screening (Sheeran and Orbell, 2000). Further, the SOC has provided a framework for several interventions which highlight the importance of matching information to the individual's own stage of change (e.g. Dijkstra et al., 1998; Quinlan & McCaul, 2000). It also forms the basis of much clinical work in the form of motivational interviewing (e.g. Miller and Rollnick, 2002).

Health behaviors are therefore linked to health problems, and numerous interventions have been designed to promote changes in health related behaviors. However, there are several problems with the approaches used to understand and promote behavior change to date. First, while some research has explored the strategies employed to promote long term behavior change, this has tended to focus on particular behaviors in isolation and has emphasized the resulting behaviors rather than the cognitions behind these behaviors. Second, while research focusing on cognitions can predict some of the variance in subsequent behavior many of the factors that determine both behavior and behavior change remain unclear and unidentified (Sutton, 1998). Third, most research to date focuses on the onset of new behaviors or changes in behavior in the short term due to the use of quantitative methods with prospective designs which have follow-ups varying from a few weeks only to a year in the minority of cases. Longer term follow-ups require a greater investment of time and cost. Further, although this methodological approach enables the prediction of future change, it relies upon variables that have been determined by the researcher and an existing theoretical framework. This is particularly problematic as much health psychology research utilizes models that were designed to predict and understand behavior per se, or short term changes in behavior not those that are sustained in the longer term. The mechanisms behind the onset of new behaviors or that predict short term changes may be different to those which underpin prolonged changes in lifestyle. Finally, although drawing upon different theoretical perspectives all such models emphasize behavior change as the result of a slow process of cognitive shifts and the development and implementation of behavioral intentions or plans. For example, the TPB conceptualizes behavioral intentions as a prerequisite for behavior change, implementation intentions are derived from Gollwitzer's (1993) notion of 'if then plans' or action phases and the SOC focuses on the gradual progression through a series of stages (Prochaska and DiClemente, 1982). It is possible, however, that such plans may only underpin short term changes in behavior rather than the longer term sustained changes which are required if an individual's health status is to benefit. Larabie (2005) interviewed 146 smokers and ex-smokers and reported that the majority of quit attempts were unplanned. Similarly, West and Sohal (2006) reported the results from a survey of ex-smokers who described why they stopped

smoking and argued that smoking cessation is often precipitated by sudden triggers rather than action plans. Furthermore, Gorin et al. (2004a) concluded from their analysis that acute medical triggers are good predictors of both long and short term changes in weight. It is possible that such triggers are also involved in changes in other forms of health related behavior.

Therefore, although there are a multitude of government, public health and individualized interventions many people continue to show unhealthy behaviors. In addition, current research tends to utilize methods that focus only on short term change and highlight factors defined by pre-existing models rather than the person themselves. This would suggest that much remains to be learnt about why people change their behavior and how this change can be sustained. In light of this, the present study aimed to explore what factors are associated with longer term changes in health related behaviors. Further, the study used qualitative methods as a means to gain insights into the perspectives of the individuals who had already managed to successfully change their behavior in the longer term. This focus on success stories has been previously used to explore weight loss maintenance (e.g. Ogden, 2000; Elfhag and Rossner, 2005; Wing and Phelan, 2005) and enables the process of longer term change to be elicited from the person themself. The present study aimed to explore whether factors exist which relate to longer term changes in health behaviors in general and to explore the cognitions behind behavior change. In particular, the study focused on smoking cessation and weight loss through changes in diet and exercise as these behaviors are linked to physical and psychological morbidity and with subsequent mortality (Mokdad et al., 2004).

Method

Design
The study used a qualitative design with in-depth semi-structured interviews.

Sample
The study aimed to explore the experiences of a heterogeneous sample of participants with a range of different experiences of behavior change. In-depth interviews were carried out with 34 individuals who had either lost weight ($n = 24$) or stopped smoking ($n = 10$). Weight loss participants were selected as they provided insights into changes in both diet and exercise behaviors. Participants were included if they had either lost 2 stone (28lb/ 12.7kg) or more or had been a regular smoker and had stopped smoking and had maintained these changes for at least 3 years. The majority of the weight loss group had lost more than 2 stone (28lb/12.7kg) and the majority of the smoking group had shown sustained behavior change for longer than 3 years. The weight loss group consisted of individuals who lost weight in the following ways: slimming club ($n = 3$), self-education ($n = 1$), meal

replacement ($n = 2$), surgery ($n = 12$), medication ($n = 6$). Obesity surgery functions by reducing the size of the stomach and requires a reduction in food intake. Obesity medication reduces the amount of fat that is absorbed from food and also requires a change in behavior if it is to be effective. Data from those who had had surgery or were taking obesity medication was collected as part of studies designed to assess the experience of the medical and surgical management of obesity. Participants' specific experiences of these forms of management have been published elsewhere (Ogden et al., 2005, 2006; Ogden and Sidhu, 2006). The smoking group had stopped smoking either through will power ($n = 8$), or a smoking course ($n = 2$). Many of those who had lost weight or stopped smoking had also changed their exercise patterns. The participants' details are shown in Table 1. All interviewees have been given a pseudonym.

Procedure

The sample was recruited from four different sources using a range of methods. The aim of this sampling procedure was to identify a heterogeneous sample of participants who showed sustained changes in diet, exercise or smoking using a variety of approaches.

Weight loss group   Those who had lost weight through slimming groups, self-education or meal replacement methods were recruited using snowball sampling. Those who had lost weight through surgery were recruited through the obesity clinic at a London hospital. Those who had lost weight through taking orlistat, which is a drug which limits the amount of fat absorbed by the body, were recruited through a London based general practice and through a company that offers ongoing patient support for those who take the drug.

Smoking group   The smoking participants were recruited by posting adverts on notice boards at two large companies asking for people who had stopped smoking for at least three years. The first was a software house, and the other was the head office of a large building contractors.

   Those who agreed to take part in the study were contacted either by e-mail or telephone and a time was arranged for an interview. Approval was obtained from the Hospital Research Ethics Committee, the University Ethics Committee, the Primary Care Trust and the Hospital Research and Development Committee. All participants were given an information sheet to read and gave either their written consent (for the hospital and Primary Care patients) or verbal consent (for the ex-smokers and those who had lost weight in a non-clinical setting).

The interviews

The interviews were semi-structured and involved open questions and prompts to encourage the participants to speak openly about their

Table 1 **Participants' demographics**

Name	Sex	Age	Behavior change	Method of changed	Time sustained (years)	Weight lost (lb)	Amount smoked (per day)	Years smoked
Caroline	F	35	Weight	Surgery	3	77		
Angela	F	37	Weight	Surgery	3	83		
Emma	F	33	Weight	Surgery	3	109		
Cathy	F	33	Weight	Surgery	3	91		
Jenny	F	25	Weight	Surgery	3	103		
Mia	F	48	Weight	Surgery	3	70		
Pat	F	43	Weight	Surgery	3	70		
Alison	F	46	Weight	Surgery	4.5	140		
Fiona	F	54	Weight	Surgery	3.5	70		
Sonia	F	49	Weight	Surgery	3.5	135		
Michael	M	41	Weight	Surgery	3	133		
Jane	F	50	Weight	Surgery	3	89		
Linda	F	51	Weight	Orlistat	2	33		
Marion	F	40	Weight	Orlistat	3	56		
Roger	M	58	Weight	Orlistat	2	42		
David	M	47	Weight	Orlistat	7	70		
Tanvir	M	44	Weight	Orlistat	6	210		
Matthew	M	43	Weight	Orlistat	6	182		
Andrew	M	25	Weight	Meal replacement	3	56		
Nicky	F	33	Weight	Club	3	35		
Helen	F	32	Weight	Club	3	28		
Jacob	M	26	Weight	Self-help	5	56		
Jackie	F	32	Weight	Club	11	70		
Louise	F	47	Weight	Meal replacement	7	112		
Peter	M	35	Smoking	Will power	5		30–40	15
Kate	F	35	Smoking	Will power	5		15	16
Ann	F	35	Smoking	Course	4		20	15
Mark	M	53	Smoking	Will power	35		20	3
Sarah	F	35	Smoking	Will power	3.5		10–25	15
Geoff	M	51	Smoking	Will power	32		20	3
Joe	M	25	Smoking	Will power	3		25	4
Robert	M	41	Smoking	Will power	20		15–20	6
Lucy	F	36	Smoking	Book	6		15	10
Adrian	M	39	Smoking	Will power	6		30	13

experiences. Questions for the weight loss group included: 'Can you tell me about how you became overweight in the first place?', 'Have you tried to lose weight in the past?', 'Can you tell me about this last time when you managed to lose weight?', 'What was happening in your life at this time?', 'How do you think you have managed to keep the weight off?' Matched questions were asked for the smoking group and included 'Can you tell me about how you started smoking in the first place?', 'Have you tried to stop smoking in the past?', 'Can you tell me about this last time when you stopped smoking?', What was happening in your life at this time?', 'How do you think you have managed to stop smoking in the longer term?' The interviews were carried out either by telephone or face to face. They were all audio-taped and transcribed.

Data analysis
The interviews were analyzed using thematic analysis to identify major themes, sub-themes and categories in line with the recommendations of Huberman and Miles (1994). The transcripts were read and re-read to ensure familiarity with the data. For each interview a coding sheet was constructed. This sheet contained all possible themes and sub-themes for the interview. References to original material were recorded under each theme. From the individual summary sheets an overall list of themes was constructed. With continuous reference to the transcripts, shared themes and connections across the list of themes were made. All the verbatim transcripts were re-read to ensure that the themes were representative of the original material. Throughout the write-up process, themes and sub-themes were adjusted and illustrative quotations were identified.

Results and discussion

The interviewees described how they had changed either their smoking, eating or exercise behaviors and how these changes had been maintained over time. From the analysis of the transcripts, two main overarching themes emerged. The first involved the role of life crises as specific triggers to initial behavior change which included health events, relationship break-ups and salient milestones. The second theme involved key sustaining conditions, which enabled this initial change in behavior to be translated into a longer term change in lifestyle. These conditions were a disruption in the function of the behavior, a perceived reduction in choice and a behavioral model of their problem in terms of both its causes and solution. These themes will now be detailed with the use of exemplar quotations.

Life crises
All interviewees described how they had previously made a series of attempts to change their behavior, which had been unsuccessful. The majority described how the attempt that had been successful had been triggered by a

specific life crisis, which could be interpreted as either positive or negative. As one woman who had lost weight said 'something needs to happen for you to see yourself, and then it works' (Helen).

For some, these life crises involved a significant threat to their health, which had made them consider their own mortality and reflect upon the need for change. For example, one man who had stopped smoking six years ago, explained:

> It was December 1999 and I had a little bit of a health scare and I ended up spending the day in hospital, nothing serious and it turned out to be a stomach thing but I had very interesting chest pains … I decided then lying in hospital, that's not how I wanted it to be. (Adrian)

Those who had lost weight also described similar health related crises. For example, David was rushed into hospital with a suspected heart attack and told 'lose weight or you will die'; Tanvir woke up in hospital with collapsed lungs caused by sleep apnoea resulting from the excess pressure on his windpipe, developed double pneumonia and then went into a coma; Matthew decided to start taking orlistat for his weight problem after his fourth heart attack at the age of 37; and Jane described how her diabetes could have ended up 'giving me gangrene in my toes'.

Tanvir described how his crisis made him decide to try taking orlistat as an alternative way to lose weight:

> when they realized I had double pneumonia it was too late because I went into a coma and at that point all my lungs did collapse and they put me on a life support machine … then I recovered slowly … While I was[in] hospital I lost about three stone [42lb]. My GP put me on [orlistat] and then I started losing the weight slowly, slowly … I suppose it was like a new life for me … when you know you are going to die and when I did get up from the coma … It was quite scary to be quite honest … and obviously it [obesity] was the main cause of the double pneumonia … I think it was the first time in my life that I really, really did want to lose the weight … It's something that I wanted to do. (Tanvir)

Therefore many people described how significant life crises involving a threat to their health had prompted them to change their behavior. For many this was a due to a sudden insight into their own mortality and an insight into the relationship between their behavior and their own health status.

For others, however, the life crisis was a salient milestone and a recognition that their behavior needed to change if their future was going to be more in line with how they wanted it to be. For some, therefore, the change was triggered by a significant birthday. For example, one woman who had smoked for 15 years and stopped for 4 years described how her decision to change had been prompted by turning 30:

> it was just in my 29th year and I was coming up to 30 and in common with quite a lot people, that was the trigger, if I don't stop now then I will be doing it for ever. It was kind of the big 'three O' which was kind of looming. (Ann)

For others, the Millennium offered a key crisis. For example, one woman who had smoked for 10 years said that she: 'decided to give up and it was Millennium New Year so it was 1999, and the big 2000 and we thought if we were going to do it, now is the best time' (Lucy). Some people also described how having children, or even the anticipation of children, triggered their change in behavior. For example, one woman who had had obesity surgery described how the desire to get pregnant had promoted a change: 'I wouldn't have been able to get pregnant naturally so that sort of spurred me on and then when I read about the operation … I decided to go for it' (Jenny).

Finally, several participants described how a relationship break-up had been their life crisis. One woman described how the break-up of her marriage had offered her the opportunity to lose weight and keep it off:

> I just had to take stock of my life … I have gone through a break-up of a marriage, but I have still got two children, I don't want to die. It's just something inside you that says if you don't sort yourself out. I think losing weight was the hardest and biggest thing that I have achieved. (Jackie)

Therefore, the majority of those who had shown successful behavior change described how a significant life crisis had prompted their initial change in behavior. For some these were related to their health; for some the crises illustrated how time was moving on and that they were not as young as they once had been; and for others, starting a family or a breakdown in a relationship was enough to prompt a shift in their behavior. Much previous research conceptualizes behavior change as the result of a series of action plans and the end point of a gradual shift in cognitions (e.g. Prochaska and DiClemente, 1982). Further, behavior change interventions aim to facilitate the development of such plans and to change cognitions as a means to promote change (e.g. Gollwitzer and Sheeran, 2006). The results from the present study indicate that such an incremental approach to conceptualizing behavior change may not always be appropriate for many individuals and that a single significant crisis can promote a shift in behavior. This focus on crises finds reflection in recent work on smoking cessation (West, 2001, 2006; Larabie, 2005; West and Sohal, 2006). West argues that smoking cessation is often precipitated by key events, which he argues can cause change in the presence of tension (West, 2006). This also supports research in the area of weight loss that highlights a role for medical triggers as important for longer term weight loss maintenance (Gorin et al., 2004a). The results from the present study support this perspective and indicate that such life crises may offer an opportunity for many people to change how they behave. The results from this study, however, also provide evidence for the mechanisms which may make a life crisis an opportunity for sustained behavior change to occur. Such mechanisms can be conceptualized as sustaining conditions.

Sustaining conditions

Many people who experience life crises, however, do not show subsequent changes in behavior, as illustrated by Matthew in the current study who waited for his fourth heart attack at the age of 37 before changing his diet and exercise patterns. Furthermore, even though many may show initial short term changes in behavior, such behavior change is rarely sustained in the longer term. The results from the present study also provide insights in how and when life crises can result in behavior change in the longer term. In particular, the transcripts highlighted a role for three sustaining conditions, which seem to account for when and why an initial short term change is translated into change in the longer term. These were a disruption of function, a perception of reduced choice and a behavioral model of the causes and solution to their problem.

A disruption of function

Many participants described how their smoking or eating behavior had served an important function in their lives prior to their change in behavior. For example, smoking was seen as sociable, as a means to manage stress and as a way to negotiate time out from work and eating was considered a form of mood management, a comfort and as a means to mark moments of celebration. Many interviewees, however, described how their precipitous life crisis disrupted these functions and rendered their old unhealthy behaviors unnecessary.

One woman, who had lost 70lb 11 years ago, described how her life crisis had helped her to sustain her behavior change. She described how she gained weight as she was having children and 'just told myself there's no point in losing my weight as I was just going to put it on again'. She also described how her husband was quite happy for her to be overweight:

> it was just like horrible, it really was, my husband at the time was like quite happy for me to be like that because then I wasn't going out, or doing anything, I don't think I even lived my life I just I brought up the two children as best I could and I was a frumpy mother. (Jackie)

However, after her marriage broke up she felt that it was time to change. She moved away, developed a new network of friends and found a new relationship. She described how these changes meant that she no longer needed to eat for comfort and found it easier to exercise and develop a healthier diet:

> The whole lifestyle changed … I had to find a new job and I had to start making new friends. Now I finish at two and I can go to the gym after work, and that time between picking up my son I get to do what I want, time to myself. (Jackie)

Similarly, one man described how he had gained weight during a bad relationship:

> Because I wasn't happy, you need to be quite happy … I would be happy then we would have a row or something and I would think, 'Oh I can't be bothered, I will go out and eat MacDonald's and feel better about it' which you don't. (Andrew)

However, after he split up with this 'monster of a girlfriend' he managed to lose weight and keep it off: 'I was back home with my family, I was seeing my friends a lot more … I wanted to look good. I wanted to look good naked, that's what I used to say to myself' (Andrew).

The function of the unhealthy eating behavior was disrupted and a new healthier mode of eating emerged. A similar pattern can also be seen for those who had given up smoking. For example, one man described how he had been a shift worker and used smoking as a means to manage stress: 'I became a shift manager running three people in a head office. It was a stressful job and smoking helped. Smoking was going up because of the job' (Robert). However, after he decided to stop he also changed his social life, which made sustaining the change easier:

> All my friends were doing it … it was natural to carry on. But then I got into a group of friends that didn't smoke and they were all boys, all men, and they didn't smoke. They played cricket and golf and it made sense at that time that I gave up. (Robert)

Similarly, one man who had mainly smoked for social reasons had tried to stop in the past but failed. He described how: 'I actually wanted to stop but I never did … The situation I was in, the people that I was hanging around with … Just didn't seem practical at the time' (Joe). However, he then enrolled on a course to be a personal trainer and nutritionist and initially believed that 'I could still be a personal trainer but just be one of those that smoked'. However, while studying the effect of smoking on the lungs he decided to stop. This was then facilitated by his new social situation on the course and the work required:

> When I was doing the course I had to revise a lot so was inside a lot. I wasn't actually going out a lot. Also a couple of my best mates who I used to smoke with had actually gone away traveling, so I was hanging around with different people. (Joe)

Therefore, many interviewees described the functions that used to be served by their unhealthy behaviors. West (2006) argues that individuals carry out unhealthy behaviors because they 'want' to as the behavior is rewarding and therefore reinforced by its consequences. Such an approach finds reflection in early learning theories of behavior (e.g. Skinner, 1953) and also reflects addiction theories, which highlight how the consequences of behaviors such as smoking and alcohol consumption increase the likelihood of their reoccurrence (Marlatt and Gordon, 1985). The results from this study highlight the multitude of ways in which smoking and an unhealthy diet may be rewarding for an individual. The results, however,

also illustrate how once this reward system has been disrupted it becomes easier for sustained behavior change to occur. If the life crisis removes the function of the unhealthy behavior, the new healthy behavior becomes more likely to continue. For some in the present study this entailed a shift in the need for smoking as a stress reduction strategy, while others had changed their social lives toward friends and activities that offered a more healthy approach to life.

A reduction in choice

A further factor that emerged from the transcripts as promoting sustained changes in behavior was the perception that their choice to perform the behavior had been reduced. This was most pronounced in the interviewees who had undergone obesity surgery who clearly believed that their reduced stomach size limited the choices they could make about food intake. For example, Fiona described how she had cut down her food intake due to the side-effects of overeating: 'If I eat too much I start to feel sick and full up and uncomfortable so it's not worth it now' (Fiona).

Similarly, Cathy described how:

> I eat 'selective eating' … because I know my stomach can only take a little bit I have to choose very carefully what I'm going to eat because if I take pizza by the time I bite the base I cannot eat anything else so I have to not bother eating pizza. (Cathy)

This sense of a reduction in choice was, however, also apparent in those who had either stopped smoking or lost weight through non-surgical means. For example, many ex-smokers described how smoking was no longer appropriate in their social groups and that to smoke would now been seen as offensive. For example, one woman who had given up smoking four years ago described how her situation was very different now to how it had been in the past: 'Generally all of them have given up, at the same sort of time that I did, I can only think of one girlfriend that smokes but ten years ago we all did' (Ann).

Another described how he had put a lot of weight on at college through drinking and going out a lot and decided to restrict his own behavior: 'I used to drive quite a lot instead. I drive say on a Friday night as opposed to drinking and I would drive everyone to the pub' (Jacob).

For one woman, her choice was restricted due to financial reasons and she described how she had stopped smoking once she had bought her first car: 'What I realized is that what I couldn't do in my budget at that time was to afford to put petrol in the car and smoke as well so something had to give really' (Sarah). While others restricted their choice by opting to mix with non-smokers in non-smoking places: 'I don't go to the pubs and bars as much as my friends that do smoke … and I do spend more time with my friends that don't smoke mainly because they're the friends that I exercise with' (Sarah). Others mentioned how having a baby had reduced their

social life so that smoking simply became more difficult to do and how their partner had stopped at the same time, again reducing the opportunities to smoke.

Sustained behavior change was therefore facilitated by a reduction in choice. For some, this reduced choice was imposed upon them by surgery, a change in their social situation or by a shift in their life circumstances. Some, however, encouraged a reduction in choice by opting to make the opportunities to either eat or smoke more infrequent. For most, this reduction in choice was experienced as liberating as it made sustaining their change in behavior less complicated. Over recent years, there has been much debate over the appropriateness of government interventions to promote healthy lifestyles through smoking bans, price increases on unhealthy foods and cigarettes and regulation of the food industry (e.g. Marshall, 2002; Dyer, 2006). Such approaches limit an individual's choice over how they behave and by some are seen as illustrative of a 'nanny state' and a reduction in human liberties. The results from the present study suggest that reducing choice may well result in a shift toward more healthy behaviors in the longer term. Further, the results indicate that even a perception that choice has been limited may have a similar result. Schwartz (2004) argued that too much choice can be overwhelming and disempowering and that some people may find a reduction in choice a liberating experience. In a similar vein, recent research on patients' experience of having obesity surgery suggests that, paradoxically, reducing choice over what foods can be eaten can increase perceptions of control (Ogden et al., 2005, 2006). The results from the present study suggest that choice reduction may be relevant for many health behaviors and can facilitate the translation of short term changes in behavior into changes in the longer term.

Behavioral model of causes and solutions
Finally, sustained behavior change also seemed to be facilitated by a behavioral model of both the cause of any problems they had and their beliefs that a behavioral solution was most appropriate. This was particularly apparent in those who had lost weight who described how their beliefs had changed over time and how only when they had begun to believe that their weight was a result of their behavior did they start to eat differently.

For example, several interviewees described how they had always been overweight and how they had believed in the past that their weight was an inevitable result of their biological makeup. As one woman said: 'I was always big as a child. I was a very big child. I was very chubby and I was chubby when I met my husband' (Helen). This woman had lost 28lb through a slimming club and maintained this loss for three years but she described why her past attempts at weight loss had failed:

> I wouldn't exercise or I would exercise and I would eat what I liked as I thought I was exercising it off … I didn't think I could do both. I was thinking 'why should I have to do both? Life is worth living.' (Helen)

However, she also described how she changed her views and this last time managed to change her behavior appropriately: 'But this time I dieted and I ate the right food, then I exercised' (Helen).

The interviewees who had lost weight through taking orlistat also described how a behavioral model of causes and solutions had facilitated their sustained weight loss. They also illustrated how the side-effects of the drug had acted as an education and had made them realize the importance of their own behavior shifting them toward a more behavioral, less medical model of their weight problem.

For example, David who had lost weight on orlistat described how his weight gain was due to: 'drinking too much … eating for comfort … lived in a house where there was always much too much to eat … finishing off children's food' (David). He then described how he had recently changed his behavior as a means to lose weight: 'I cut out carbohydrate, eat fruit and vegetables, have a high protein diet … eat three meals a day religiously' (David). He therefore showed a behavioral model of causality that was matched to a behavioral model of a suitable solution. David described how this match had been facilitated by the side-effects caused by the drug:

> I had near misses … I don't break wind unless I'm sitting on the toilet. It's a fear thing – I have had situations where I've had to discard a pair of boxer shorts … this taught me very soon … made me think that I can't eat the bad things. (David)

A similar pattern was also shown by those who had stopped smoking, particularly by those whose life crisis had been health related. For example, one man described how he had experienced symptoms that he attributed to his smoking: 'It was a day that I was running around with my daughter and I had a major coughing fit and the look on my daughter's face, my wife was getting worried as well' (Peter). As a result of believing that his problem was caused by his smoking behavior he decided to quit. This association between causes and solutions was facilitated by his experience of relapsing a few years later: 'I had three puffs on January 4th this year, but I was coughing like anything, which is good' (Peter).

Sustained behavior change, therefore, seemed to be facilitated by a behavioral model of causes and solutions. In particular, those who believed that their weight had been caused by their lifestyle and believed that the best solution was to change their lifestyle reported sustained behavior change. Similarly, those who had experienced breathlessness and attributed their symptoms to smoking showed smoking cessation. Research drawing upon Leventhal's self-regulatory model (e g. Leventhal et al., 1997) highlights the role of illness representations in understanding a range of behaviors such as medicine taking and adhering to recommendations for lifestyle change (Petrie et al., 1996; Figueiras and Weinman, 2003). Research also highlights the importance of concordance between illness beliefs and treatment beliefs (e.g. Horne and Weinman, 1999). To date, however, research from

this perspective has tended to assess short term changes in behavior. The results from the present study support such studies but suggest that an emphasis on behavior as central to both the cause and solution of a problem is also associated with behavior change that is sustained over time. This also reflects previous research, which reported that a more psychological model of obesity was associated with weight loss maintenance (Ogden, 2000) but illustrates that such a model may also be relevant to health related behaviors in general.
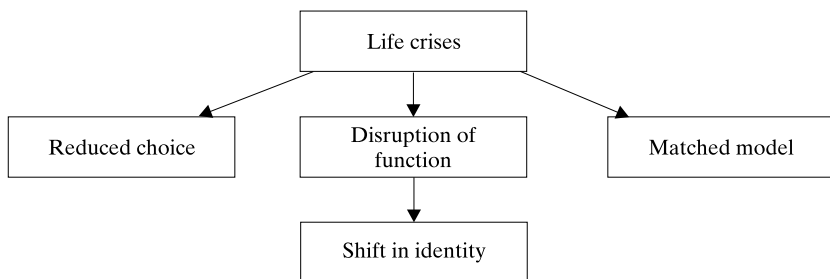
Conclusion

The results from the present study provide some insights into the conditions underlying sustained changes in health behavior derived from the accounts of 'success stories' which has enabled the exploration of change in the longer term and has highlighted factors outside those described by existing theoretical perspectives. In particular, the results indicate how sustained behavior change may be triggered by a significant life crisis relating to factors such as health, relationships or salient milestones. The results also illustrate how such initial changes in behavior are translated into behavior change in the longer term if the function of the unhealthy behavior is disrupted, the individual perceives that their choice over when and how to perform the unhealthy behavior has been reduced and if they hold a behavioral model of the causes and solution to the problem. Therefore, if a person no longer benefits from the behavior, finds that there are fewer opportunities to carry out the unhealthy behavior and believes that the behavior was the cause of their problems, then an initial change in behavior is more likely to be translated into behavior change in the longer term. Such a model of sustained behavior change indicates that the mechanisms underlying longer term changes may be different to those identified as central to changes in the shorter term. Future research could empirically test this possibility and assess whether the results from the success stories in the present study do indeed generalize either to unsuccessful participants or those who only show short term changes.

Central to all the themes emerging from the transcripts was a process of reinvention and a shift in identity toward a new healthier individual. For example, the life crisis offered up an opportunity for reinvention as the old identity was challenged. This reinvention was then facilitated by the function of the old behavior being disrupted and a reduction in choice over when and where to perform the behavior. Furthermore, the behavioral model of causes and solutions enabled a new identity to be created with the new healthier behavior at its core. In line with this, several participants had taken up new roles which centered upon their new healthier lifestyle: becoming, for example, a gym instructor, a personal trainer and nutritionist, a cardiac therapist and an organizer for a weight loss group. Most described a great commitment to being a healthier person, with some having run

marathons and triathlons and many showed complete adherence to their new healthier regimen. For all interviewees, not smoking, exercise and healthy eating had become a central part of their new self. And central to this new self was being healthy and the absence of the old, now redundant, behaviors. As one woman described 'I became a real ex-smoker – hate the smell – and I haven't looked back since' (Sarah). Similarly, smokers were described as 'gross', 'dependent', 'desperate' and 'frantic'. Behavior change seemed to be sustained by an almost evangelical approach to their new lifestyle, a process of reinvention and the development of a new sense of identity. West (2006) argues that identity is central to understanding behavior and that the mental representations we form of ourselves and our emotions are core to us as self-conscious beings. Some researchers have also argued for the addition of self-identity to social cognition models (Sparks and Shepherd, 1992). The results from the present study support a role for self-identity in behavior. The results, however, also indicate how self-identity can change and how a process of reinvention of this identity may be bound up with sustained changes in behavior. In sum, significant life crises can bring about initial changes in behavior. Further, if such short term changes occur in the context of sustaining conditions then the individual can undergo a process of reinvention and the new healthier behavior can be incorporated into a new self-identity. Longer term changes in behavior will then follow. This model of sustained behavior change is shown in Figure 1.

To conclude, previous research has either focused on individual behaviors, or behavior change in the short term and has tended to emphasize the development of plans and a gradual shift in cognitions. The present study indicates that sustained behavior change may involve a different set of mechanisms and that if triggered by a life crisis it requires a set of sustaining conditions to facilitate a process of reinvention and the development of a new healthier identity. But whether the crisis, sustaining conditions and process of reinvention are either sufficient or necessary remains to be explored. It is possible that the life crisis is essential if a new self is to

Figure 1 **Sustained behavior change**

be created. From this perspective, the life crisis may trigger initial changes, which are translated into longer term changes in lifestyle in the context of the sustaining conditions and a process of reinvention. But what determines whether an event is conceptualized as a life crisis? In line with a self-regulatory approach, perhaps the different elements of this model interrelate in a non-linear way (Leventhal et al., 1997) with the life crisis, sustaining conditions and process of reinvention existing within a dynamic relationship. Accordingly, as the individual is presented with a potential life crisis, these factors interact to determine whether or not the individual utilizes this opportunity as a means to establish a new healthier equilibrium. The life crisis offers the chance of an 'epiphany' or a time to 'see the light', and the sustaining conditions influence whether or not this opportunity translates into a shift in both behavior and self-identity.

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