



## The eternal quest for optimal balance between maximizing pleasure and minimizing harm: The compensatory health beliefs model

Marjorie Rabiau\*, Bärbel Knäuper and Paule Miquelon  
McGill University, Montreal, Canada

Particularly in the health domain, humans thrive to reach an equilibrium between maximizing pleasure and minimizing harm. We propose that a cognitive strategy people employ to reach this equilibrium is the activation of Compensatory Health Beliefs (CHBs). CHBs are beliefs that the negative effects of an unhealthy behaviour can be compensated for, or “neutralized,” by engaging in another, healthy behaviour. “I can eat this piece of cake now because I will exercise this evening” is an example of such beliefs. Our theoretical framework aims at explaining why people create CHBs and how they employ CHBs to regulate their health behaviours. The model extends current health behaviour models by explicitly integrating the motivational conflict that emerges from the interplay between affective states (i.e., cravings or desires) and motivation (i.e., health goals). As predicted by the model, previous research has shown that holding CHBs hinder an individual’s success at positive health behaviour change, and may explain why many people fail to adhere to behaviour change programs such as dieting or exercising. Moreover, future research using the model and implications for possible interventions are discussed.

Humans struggle to reach an optimal equilibrium between fulfilling their desires and adhering to their goals (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister, Heatherton, & Tice, 1994; Metcalfe & Mischel, 1999; Mischel, 1996; Muraven & Baumeister, 2000). In other words, they strive to find an appropriate balance between maximizing pleasure and minimizing harm, which has been referred to as the pleasure or hedonic principle (Higgins, 1997). For example, people are faced with temptations and desires such as eating delicious but unhealthy foods, smoking, or drinking alcohol, but also hold goals such as remaining healthy, being thin, or being athletic. As these examples illustrate, such struggles are particularly prominent in the health domain and the outcome is of prime importance. Being able to exert self-control over health behaviours, that is, resist temptation in the course of goal pursuit (Metcalfe & Mischel,

\* Correspondence should be addressed to Marjorie Rabiau, Department of Psychology, McGill University, 1205 Dr. Penfield Avenue, Montreal, QC, Canada H3A 1B1 (e-mail: mrabiau@ego.psych.mcgill.ca).

1999), is a key factor in maintaining one's health. Therefore, enhancing people's self-control could have a great impact on the prevention of disease.

As of now, much of the work attempting to explain and predict health behaviour has implicitly assumed that health behaviour choices are primarily the product of reasoned cognitive processes. For example, Rogers' (1975, 1983, 1985) protection motivation theory assumes that people's health behaviour is a function of perceived severity, vulnerability, response effectiveness, and self-efficacy. Ajzen's (1985, 1991) theory of planned behaviour regards health behaviour as being primarily determined by the individual's intention to perform the behaviour in combination with perceived behavioural control. In turn, intention to perform the behaviour is predicted by three factors: positive and/or negative attitudes towards the behaviour, perceived behavioural control and subjective norms. Even though these well-validated models address affective states and motivation, they do not specifically address the interplay between the two. The model proposed here, in contrast, focuses on the motivational conflict that arises from the interplay between affective states (e.g. cravings, anticipated pleasure, and desires) and motivation (e.g. goals). The model is grounded in previous theories of health self-regulation but further integrates an affective component (desires or anticipated pleasure) as well as a motivational component (health goals) and the motivational conflict resulting from the interplay between the two.

### **Self-regulation towards resisting temptations: Compensatory health beliefs**

When individuals are faced with a temptation, the conflict between their wish for the desired object or activity and their other goals (e.g. stay healthy) may create a motivational conflict or anticipatory guilt (Giner-Sorolla, 2001). This motivational conflict can be described as the perception of a discrepancy among cognitions generating a negative intra-personal state of cognitive dissonance (Festinger, 1957), which in turn motivates the individual to seek and implement a strategy to alleviate this unpleasant state. We propose that one of the strategies used to alleviate that state of discomfort is to activate compensatory health beliefs (CHBs). CHBs are beliefs that the negative effects of a volitional unhealthy behaviour can be compensated for, or 'neutralized,' by engaging in another, volitional healthy behaviour. The concept of volition is highlighted in the definition to emphasize that this construct is relevant to behaviours requiring self-control. These are situations in which short-term outcomes are in opposition to long-term outcomes (Trope & Fishbach, 2000). Specifically, in order to experience conflict upon performing an unhealthy behaviour, this behaviour cannot be one that the person has no control over (environment) or one that is performed through automatic processes (Bargh & Chartrand, 1999). If a person does not have, or does not perceive having, control over a situation, he or she will not experience a self-regulation conflict (Ajzen, 1991).

The nature of CHBs can best be illustrated with examples: being faced with a temptation such as an enticing piece of cake, a cigarette, or a drink, a person may be torn between the pleasure that would be obtained by fulfilling the desire and the knowledge that it will be bad for one's health. To resolve the conflict, the person might escape to the belief that eating the cake, smoking the cigarette, or having the drink is fine because he or she will go to the gym later that day, thus annihilating negative effects by making up for the consumed calories, the decrease in lung capacity, or the consumed alcohol. In other words, the person may believe that the negative effects of the indulgence can be compensated or 'neutralized' by exercising later. Thus, the compensatory behaviour is

used to justify the indulgence (see Hart, 1993, for a similar reasoning). In sum, CHBs are defined as beliefs that certain volitional, unhealthy (but pleasurable) behaviours can be compensated for by engaging in healthy behaviours. We propose that they are motivated justifications of maladaptive health-related behaviours. It is important to emphasize that the constructs of CHBs can be applied to a wide array of health behaviours such as illicit drug use, adherence to treatments, and so on, and that scales can be developed to measure domain-specific CHBs.

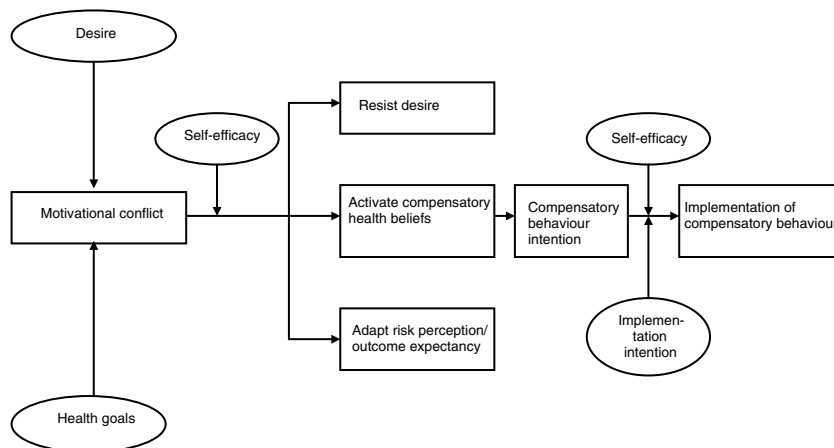
CHBs can be scientifically accurate, partially accurate, or inaccurate. However, in line with our proposition that CHBs are motivated justifications of maladaptive health-behaviour choices, we suggest that people are motivated not to question the validity of the CHBs that they hold. Distinguishing between accurate or inaccurate CHBs can be difficult because unhealthy behaviours can have, and usually do have, multiple negative effects on health, and the compensatory behaviour can potentially compensate for some, but not all of these negative effects. As we will outline in more detail below, the overall effect on health of holding a lot of these beliefs can be expected to be negative. In this paper, we introduce a theoretical framework that aims at explaining why people develop CHBs and how they employ and maintain CHBs to resolve 'guilty-pleasure' dilemmas (Giner-Sorolla, 2001).

### **Compensatory health beliefs model**

In a quest towards understanding affective and motivational influences on human health choices and subsequent health goals and behaviours, we developed a theoretical framework based upon the protection motivation theory (Rogers, 1975, 1983), the theory of planned behaviour (Ajzen, 1985), Schwarzer's (1992, 1999) integration of these two models (the Health Action Process Approach; HAPA), and the self-concordance model (Sheldon, 2002; Sheldon & Elliot, 1999), which is based on the concepts of self-determination theory (SDT; Deci & Ryan, 1985, 2000). The self-concordance model extends SDT research by focusing on people's personal goal statements rather than focusing on domain-specific motivation. We have termed the health behaviour framework emerging from the integration of these models the *compensatory health belief (CHB) model*. The CHB model presents an attempt at explaining why people develop CHBs and how they employ CHBs to self-regulate resisting temptations, and their power in predicting health choices and future health outcomes. Major components of the CHB model include motivational conflict between desire and goal, or cognitive dissonance (Festinger, 1957; Mischel, 1996), goal self-concordance, or the extent to which people pursue their set of personal goals out of self-determination (Sheldon, 2002; Sheldon & Elliot, 1999), self-efficacy (Bandura, 1977; Schwarzer & Renner, 2000), intentions (Ajzen, 1991), and implementation intentions or plans (Gollwitzer, 1999; Gollwitzer & Brandstätter, 1997). The processes described in the model start out with the motivational conflict between desires and health goals (i.e. cognitive dissonance) when having the opportunity to engage in a pleasurable, but unhealthy activity or, alternatively, after having engaged in a behaviour believed to be unhealthy. It ends with either the implementation of the compensatory behaviour or with a suspension of the intention to engage in it. The model will be described in detail below and is illustrated in Fig. 1.

#### **Conflict resolution attempts**

As mentioned earlier, the interaction between the temptation to engage in an unhealthy behaviour and one's health goals creates a motivational conflict (i.e. cognitive



**Figure 1.** Compensatory health beliefs model.

dissonance). An example would be the desire or craving to smoke but the awareness that it is not good for one's health. We propose that the conflict between the desire to indulge in a tempting behaviour and the cognitive reasoning of its maladaptive consequences can mainly be alleviated by the following three strategies (see Fig. 1): (1) deciding to resist the desire (i.e. resist smoking), (2) adapting the perception of the degree of risk or harm caused by behaviour and/or re-evaluating outcomes expectancies, and (3) creating or activating compensatory health beliefs. The first strategy, not giving in to the temptation, is a behavioural strategy, whereas the other two are cognitive strategies. The behavioural strategy involves making the decision that one will not indulge in the temptation and therefore alleviates the motivational conflict, as one did not engage in an unhealthy behaviour. The first cognitive strategy is to adapt the outcome expectancies about the temptation (i.e. to change one's belief that the behaviour is indeed unhealthy or interfering with one's goals; cf. Baumeister & Heatherton, 1996; Giner-Sorolla, 2001; Stroebe, 2002; Trope & Fishbach, 2000). For example, a person might think that not exercising will not harm their cardiovascular health. In addition, people might adapt their risk perception such that they are, after all, not that much at risk for heart disease. It has been shown that risk perception and outcome expectancy are two of the major cognitions operating in the formation of goals (Schwarzer, 1999). This suggests that modifying either one of these cognitions or both will alleviate the motivational conflict by reducing the importance of the goal, if only temporarily. Once individuals no longer believe that the behaviour is harmful or once they are less concerned about the negative health effects impacting them in particular, they may engage in the desired behaviour freely. Note that both strategies, (1) resisting the desire and (2) changing health beliefs, are quite effortful and require substantial self-control (Baumeister *et al.*, 1994).

The third conflict resolution strategy, creating or activating CHBs is, we suggest, the easiest path an individual can follow because it permits 'the best of both worlds.' Specifically, a belief is activated that one can compensate for giving in to the temptation by executing another health behaviour that one believes to 'neutralize' or compensate for the ill effects of this behaviour. By activating these beliefs it becomes possible to indulge in the desired behaviour without the accompanying negative affect (e.g. guilt). Or, if one already indulged in it, CHBs can relieve arising feelings of discomfort. Instead

of changing the desire to eat (Strategy 1) or revising one's beliefs (Strategy 2), the person justifies the behaviour by planning to compensate for it later.

What determines which conflict resolution strategy will be used? We predict that it is determined by two main factors and that both play a crucial role in determining the level of motivational conflict: (1) the degree of desirability of the tempting behaviour and (2) a person's health goals self-concordance. The first option, resisting the desire, is particularly likely to be used when the desire is not strong, when one's health goals are pursued out of self-determined motivation, and when the individuals' self-efficacy to control their desire is high (cf. Kuhl, 1984, 1994). In contrast, the second and third strategy, changing a belief related to the desire or using a CHB, will be used when the outcome of the desired behaviour is greatly satisfying and cannot be resisted (Marlatt, Baer, Donovan, & Kivlahan, 1988; Newcomb & Harlow, 1986; Norman, Conner, & Bell, 1999).

### **Motivational conflict**

As outlined in Fig. 1, a motivational conflict is created when the desire to engage in a tempting behaviour diverges with a health goal such as staying healthy or losing weight. According to our theory, this conflict is the motivational catalyst that leads to the activation of a CHB. We assume that CHBs only become activated when a motivational conflict arises because the individual believes that the desired behaviour may come at a cost to his or her goals. Such conflicts can arise in a variety of situations, as temptations can vary widely in their form and strength. For example, temptations can be as far ranging as food, drugs, or simply taking the car rather than walking. The effect of the degree of desire on the activation of CHBs is, probably, non-monotonic: when the behaviour is not very desirable and the person has high health-related self-efficacy, people should be capable of resisting the desire and CHBs are unnecessary and therefore will not be activated (cf. Giner-Sorolla, 2001). High health-related self-efficacy should be associated with a low tendency to hold and use CHBs. When the temptation is extremely desirable and people are unable to resist, they may not be able to use CHBs because they feel the strength of the desire justifies the behaviour. Again, CHBs would not get activated. Thus, an inverted U-shaped function of the desirability of the temptation, and the exertion of CHBs can be expected with CHBs being most likely activated for medium-desirable behaviours (see Trope & Fishbach, 2000, for a similar reasoning).

The value of one's goals, in other words, how important the outcome is to the person, will also have an impact on the amount of conflict (Fishbach, Friedman, & Kruglanski, 2003; Trope & Fishbach, 2000). According to goal system theory, goals are construed as knowledge structures, defined as cognitive representations which can be activated (Shah & Kruglanski, 2003). Therefore, the importance of a goal can be enhanced if it is primed or activated, which Shah and Kruglanski argue can be done by presentation of means towards achieving that goal (behaviours or situations). For example, being primed with the words 'reading' and 'studying' activates the goal of academic achievement, and therefore will make the goal more likely to be attained.

One's health goals (e.g. exercising regularly, eating healthy, quitting smoking) can also be pursued out of self-determined motivation (i.e. goals are pursued because of strong interest or self-identified personal convictions; self-concordant goals), or out of non-self-determined motivation (i.e. goals are pursued because of external pushes or rewards, or introjected sanctions characterized by anxiety and guilt; non self-concordant goals; for details, see the self-concordance model; Sheldon, 2002; Sheldon &

Elliot, 1999). Because self-concordant goals express developing interests and deep-seated values, they are relatively enduring facets of personality. Therefore, these goals are more likely to receive sustained effort and to be attained over time (Sheldon & Elliot, 1999; Sheldon & Houser-Marko, 2001). Consequently, we predict that the self-concordance of one's health goals will influence whether CHBs will be activated or not. Specific predictions are thoroughly detailed in the following section.

### **Health goal self-concordance and CHBs**

We propose that self-concordance will predict the most likely route that individuals will take in attempting to reduce the motivational conflict they experience between a specific desire and their health goals. The self-concordance model proposes that different types of motivation are associated with the pursuit of personal goals. According to SDT (Deci & Ryan, 1985, 2000), these types of motivation represent a self-determination continuum, along which intrinsic motivation corresponds to the more self-determined form of motivation, and is observed when one engages in a behaviour for the pleasure and satisfaction inherent to it. Unlike intrinsic motivation, identified (i.e. one engages in a behaviour out of choice and personal values or convictions), introjected (i.e. one performs a behaviour in order to avoid guilt or anxiety or to attain ego enhancements, such as pride), and external (i.e. one engages in a behaviour to satisfy an external demand or reward contingency) regulation are extrinsic forms of motivation (i.e. one engages in a behaviour or an activity in order to attain some separable outcome, rather than for its inherent satisfaction). Identified, introjected and external regulation, respectively, range from the more to the less self-determined forms of motivation along the continuum and reflect differing degrees to which the regulation of a requested behaviour have been internalized and integrated (Deci & Ryan, 2000; Ryan & Deci, 2000). *Internalization* refers to people's 'taking in' a regulation, and *integration* refers to the further transformation of that regulation into their own so that, subsequently, their behaviour will be more self-determined. Deci and Ryan further suggest that feelings of autonomy (i.e. feeling that one's behaviour is self-chosen and meaningful), competence (i.e. feeling that one is effective and able in one's behaviour), and relatedness (i.e. feeling that one is connected to or in harmony with important others) will facilitate the internalization of extrinsically-motivated behaviours, while only autonomy will allow the integration of these behaviours into the self.

Because several aspects of health behaviours (e.g. eating healthily, taking medication, exercising regularly, seeing a doctor or quitting smoking) are unlikely to be perceived as very exciting or interesting (i.e. purely intrinsic), we believe that most health goals will rather be pursued through one or more of the three types of extrinsic motivation described above. Consequently, we do not consider the role of intrinsic motivation in our predictions regarding the relation between health goals self-concordance and the activation of CHBs. Therefore, the next section primarily introduces hypotheses regarding the relationship between extrinsic motivations and the activation of CHBs.

### **External regulation**

External regulation includes the classic instance of being motivated to obtain rewards or avoid punishments. For example, one might try to stop smoking simply to win a prize in a contest. Because it hampers autonomy and is dependant on the contingency, external regulation shows the poorest behaviour maintenance (Deci & Ryan, 2000). In the CHB

model, we hypothesize that health goals that are externally regulated will most probably result in people not resisting the temptation (e.g. eating sweets) and changing their outcome expectancies and/or risk perception beliefs (e.g. changing the belief that the behaviour is unhealthy, Strategy (2)). The basis of this hypothesis stems from the fact that in externally-motivated health goals, the value of being healthy (or fit, thin, etc.) is not yet part of the self. Therefore, the volitional strength behind these goals is more likely to fade when obstacles are encountered, and therefore, they are less likely to be attained (e.g. Sheldon & Elliot, 1999). We can infer from this that the threshold for the degree of desirability of the temptation does not need to be very high to outweigh the importance of externally-regulated goals.

#### **Introjected regulation**

Unlike external regulation, introjected regulation involves an external regulation having been internalized, but not truly accepted as one's own. Introjection-based behaviours are performed to avoid guilt and shame or to attain feelings of worth. We suggest that people holding introjected regulation towards their health goals will most often use CHBs as a way to reduce the conflict because their motivation is strong enough to prevent them from changing their beliefs but not potent enough to permit them to resist the temptation. Therefore, resorting to CHBs is a likely alternative. In addition, introjected regulators have been found to be most sensitive to feelings of guilt or pride (Deci & Ryan, 2000). We reason that CHBs are effective and efficient in alleviating such feelings.

#### **Identified regulation**

Identified regulation involves a conscious valuing of a behavioural goal or regulation, an acceptance of the behaviour as personally important. For example, people might realize the importance of eating well and not smoking for their health, and make these values a prominent part of their identity. According to Deci and Ryan (2000), behaviours under identified regulation are better maintained, and are associated with higher commitment and performance. We hypothesize that people who have identified regulation regarding health goals will most often be able to resist their temptation and only rarely use CHBs as a way to reduce their dissonance.

#### **Compensatory behaviour: Intention, plan, and implementation**

Once the compensatory health belief has been activated, for it to successfully reduce the motivational conflict, it requires the creation of an intention to actually perform the compensatory health behaviour (see Fig. 1). In Schwarzer's HAPA model, *action plan* refers to the individual's intended action towards the achievement of a desired health behaviour (see also Bagozzi, 1992; Gollwitzer, 1993). In Ajzen's (1985, 1991) theory of planned behaviour, intention is the central factor in predicting behaviour. In our model intention would be equivalent to Gollwitzer's concept of goal intention, which he describes as a feeling of commitment to achieve the subgoal (e.g. I intend to exercise to make up for eating the piece of cake; Gollwitzer, 1999; Gollwitzer & Brandstätter, 1997). Goal intentions are to be differentiated from implementation intentions, which are self-regulatory strategies that involve linking an anticipated future situation to a certain goal-directed behaviour, that is, to make a detailed plan (e.g. I intend to exercise at the gym when I leave work at 1800 hours for the aerobics class). Accordingly, the compensatory behaviour plan or implementation intention is a stage where individuals create and visualize a concrete and detailed outline of how they will compensate for the unhealthy

behaviour. It involves self-efficacy in an attempt to imagine viable routes to goal attainment (cf. Schwarzer, 1992). Without an execution plan for the compensatory behaviour, an individual is likely to lose sight of the way to perform the action, and would fail to initiate the behaviour. Extensive research has shown the benefits of implementation intentions towards goal completion (Gollwitzer, 1999; Gollwitzer & Brandstätter, 1997; Verplanken & Faes, 1999; Webb & Sheeran, 2003). Through the process of maintenance, 'competing intentions' that serve to undermine the action in progress are kept under control. As such, the person must continue foreseeing successful outcomes in order to keep all other distracting intentions at bay. When applied to the present model, maintenance consists of imagining one's self successfully carrying out the behaviour that compensates for the unhealthy behaviour (e.g. eating more at lunch after having skipped breakfast).

After developing a plan, individuals face the choice of carrying out the compensatory behaviour or not. Individuals who conclude that they are, indeed, capable of carrying out the compensatory health behaviour specified in the CHB plan, then initiate it and execute it successfully. The execution of the compensatory behaviour results in an effective reduction of the motivational conflict and any negative affect attached to it because the individuals believe that they have 'erased' or 'neutralized' the maladaptive effects of the satiation behaviour by carrying out the compensatory behaviour.

The other possibility is to not complete the compensatory behaviour, which will result in the continued existence of a state of conflict. The added level of discomfort caused by the failure to engage in the compensatory behaviour can persist until (1) individuals re-evaluate their self-efficacy concerning the compensatory behaviour and carry it out, (2) individuals seek relief in the other possibility for resolving the conflict as described earlier, and specifically change their beliefs of risk perception and outcome expectancy, or (3) the discomfort simply abates with the passage of time. As mentioned above, execution of the compensatory behaviour is facilitated by a clear action plan, but also depends on one's level of self-efficacy.

#### ***Influence of self-efficacy on compensatory behaviours***

As described in Schwarzer's (1992, 1999) HAPA model, self-efficacy is paramount for action to occur. The importance of self-efficacy has been demonstrated for initiating and persistence in general behaviour (Bandura, 1977) and health behaviour specifically (e.g. Block & Keller, 1998; Hevey, Smith, & McGee, 1998; O'Leary, 1985). Hevey *et al.* reviewed the use of self-efficacy in health-promoting behaviours in areas as diverse as exercise, smoking, and drug use. As in prior models (HAPA), it is hypothesized that self-efficacy will have an impact at different stages in our model. First of all, as mentioned earlier, self-efficacy will have an impact on the goals that people set for themselves (this part is not represented in the depiction of the model; Schwarzer, 1999). Once the motivation conflict is in motion, self-efficacy will impact on whether the person will be able to resist the desire or instead, give in and resort to a cognitive strategy.

Given the importance of self-efficacy in practising health behaviours, there is reason to believe that an evaluation of self-efficacy will be necessary in the process of generating a compensatory action that individuals *believe* they can execute. If self-efficacy is low concerning the compensatory behaviour, there is little chance individuals will perform the behaviour as they lack the conviction necessary to be able to carry it through. Not performing the compensatory behaviour will deflate individuals' self-efficacy, reinforcing the negative cycle between low self-efficacy and not carrying out the behaviour. However, when self-efficacy is high, it is predicted that individuals will



perform the compensatory behaviour. Moreover, once the compensatory behaviour is achieved, it will in turn strengthen the individuals' sense of self-efficacy.

### **Predicted effects on health outcomes**

When the compensatory behaviour does in fact compensate for the negative effects of indulging in the temptation, and if one actually performs the compensatory behaviour, the overall health outcome of holding CHBs would be positive. However, to the extent that (1) the compensatory health behaviour does not, in fact, compensate for the negative effects, and (2) individuals fail to follow through with the compensatory behaviour, CHBs can be expected to result in negative health outcomes. That is, individuals might erroneously believe a certain compensatory behaviour indeed eliminates the negative effects of a certain unhealthy behaviour. Continuously engaging in an unhealthy behaviour – falsely assuming that the subsequent compensatory behaviour ‘makes up’ for it – can lead to poor health in the long term. Moreover, as outlined earlier, it is difficult for most CHBs to distinguish whether they are accurate or not because the unhealthy behaviours with which CHBs are concerned can have multiple negative effects on health and the compensatory behaviour can potentially compensate for some, but not all of these negative effects. Second, even if the compensatory behaviour is mostly effective, people often do not manage to follow through with their plans. They may procrastinate regarding the compensatory behaviour and, while time passes, the initially felt discomfort may weaken until the need for the compensatory behaviour is no longer felt. It can therefore be assumed that, overall the tendency to engage in CHBs is associated with negative health outcomes over time.

### **Empirical support for the model**

Knäuper *et al.* (2004) developed and validated a psychometric scale to measure individual differences in using CHBs. Factor analysis yielded a scale of 17 items with four subscales (substance use, eating/sleeping habits, stress, and weight regulation) explaining 51.02% of the total variance. The scale demonstrated strong psychometric properties with good internal consistency ( $\alpha = .80$ ), and high stability as measured by test-retest reliability at the 4.5–5-month interval ( $r_{tt} = .75, p < .0001, N = 141$ ). The CHB scale showed convergent validity with health self-efficacy ( $r = -.20, p = .04$ ) and the personality factor ‘conscientiousness’ measured with the NEO Five-Factor Inventory (NEO-FFI) ( $r = -.19, p = .04$ ), and discriminant validity with all other measures of personality, health locus of control, and importantly, with social desirability. Moreover, higher CHB scores were significantly related to more health-related risk behaviours ( $r = .29, p = .002$ ) and more illness symptoms reported ( $r = .28, p = .003$ ). Interestingly, specific CHB subscales were significantly related to the corresponding specific health-related risk behaviours (substance use  $r = .41, p < .0001$ , eating/sleeping habits  $r = .21, p = .02$ , and weight regulation  $r = -.25, p = .009$ ). Furthermore, individuals with a BMI of 27 or greater (indicating being overweight or obese) were found to hold more CHBs. Rabiau and colleagues showed in a sample of female dieters that scores on the scale are predictive of self-regulatory success or failure (Rabiau, Knäuper, Miquelon, & Grouzet, 2005). The extent to which dieters adhered to the rules over the course of their diet was examined by comparing the degree to which they reported the same rules at Time 1 and Time 2. Dieters who scored higher on eating and dieting-related compensatory beliefs showed lower adherence to self-set dieting rules

( $r = .21$ ,  $p = .02$ ), and were more likely to have a history of unsuccessful dieting as measured by Herman and Polivy's (1980) Restraint scale<sup>1</sup> ( $r = .34$ ,  $p < .001$ ).

Dispositional variables that were found in these two studies to negatively moderate the use of compensatory health beliefs were eating-related self-efficacy, self-determined motivation and conscientiousness (Knäuper *et al.*, 2004; Rabiau *et al.*, 2005). These findings suggest that a chronic use of compensatory beliefs results in lower goal attainment, particularly among individuals who lack the self-regulatory abilities and resources necessary for implementing the compensatory behaviour, as the model predicts.

### Future research

The CHB model can be used to derive predictions for explaining health behaviour choices. For example, health goals self-concordance is hypothesized to predict the type of conflict resolution strategy that will be employed. Similarly, we predict a moderating role of self-efficacy on the type of conflict resolution strategy used and on the probability to carry out the compensatory behaviour. Moreover, we predict that the compensatory behaviour is more likely to be implemented when an implementation intention was clearly outlined. Also, as explained previously, the strength of the temptation plays an important role: CHBs should be more prevalent when a person has been primed with or is in presence of a temptation. Therefore, different environments can be created to test 'diathesis-stress' types of predictions in which the strength of temptations is manipulated. This has been done in past studies, for example, by presenting people with either chocolate cookies or their fat-reduced alternatives (Baumeister *et al.*, 1998). These hypotheses would best be studied in a prospective design in order to uncover the causal mechanisms and the capacity of CHBs to predict health behaviour and health outcomes. Experimental and prospective studies are needed to examine whether the predicted desire-goal conflict, CHB activation, intentions and behaviours actually occur in the sequence and manner specified in our model. We are currently preparing a study using experience-sampling methodology (ESM) that is aimed at testing the model's predictions in naturalistic conditions of actual eating situations among dieters. The study assesses prospectively how individual dispositions combine with internal (physiological) and external (environmental) factors to elicit CHBs and when the use of CHBs results in self-regulation failure and thereby lower goal-attainment. ESM (DeVries, 1992) is a measurement technique where individuals are signalled at random or fixed intervals and instructed to record responses to questions. Participants will receive a palmtop computer to carry with them for 7 consecutive days and will be signalled at random seven times per day. At each signal, participants complete a short questionnaire on the palmtop related to the last eating or temptation episode, whichever they experienced last. To provide the reader with an idea of how the various concepts in the model can be empirically operationalized, we are providing an overview of the measures of the planned study in Table 1. This study will allow assessment on how CHBs predict goal attainment in interaction with other signal-level and person-level variables.

---

<sup>1</sup> That the Restraint scale (RS) measures unsuccessful dieting was suggested by a number of authors (Heatherton & Baumeister, 1991; Lowe, 1993; Lowe & Timkio, 2004; Ruderman, 1986) based on the notion that it contains items that assess the tendency to overeat, the frequency of past dieting attempts, and the degree of weight cycling.

**Table 1.** Measuring the constructs of the CHB model in an experience-sampling study

Name of the construct	Measurement of the construct
Desire	How pleasant did you expect the food to taste? ( <i>not at all pleasant to very pleasant</i> ) How much did you crave this food before you ate it? ( <i>not at all to very much</i> )
Health goals	How important is it at this moment for you to maintain your weight or lose weight? ( <i>not at all important to very important</i> )
Motivational conflict	To what extent did you feel the following way right before you ate? Guilty, nervous, happy [etc.] To what extent did you feel the following way after eating? Guilty, nervous, happy [etc.] ( <i>not at all to very much</i> )
Temptation regulation self-efficacy	How confident did you feel that you would be able to resist eating the food? ( <i>not at all confident to very confident</i> )
Adaptation of outcome expectancies	To what extent do you think that eating the food will interfere with your goal to maintain or lose weight?
CHB activation	To what extent did you think that you would make up for eating the food, for example by exercising later or by eating less at the next meal? ( <i>not at all to very much</i> )
Compensatory behaviour intention	To what extent do you intend to make up for eating the food, for example by exercising later or by eating less at the next meal? ( <i>not at all to very much</i> )
Compensatory behaviour self-efficacy	How confident are you that you will be able to make up for the food eaten, for example, by exercising later or by eating less at the next meal? ( <i>not at all confident to very confident</i> )
Implementation intention	How concretely do you envision making up for eating the food, for example, by exercising later or by eating less at the next meal? ( <i>not at all concretely to very concretely</i> )
Implementation of compensatory behaviour	The last time you had made a plan to compensate for giving in to the temptation, did you actually follow through with your intention? ( <i>yes/no</i> )

Note. All constructs, except for the last one, are being assessed on 7-point Likert-type rating scales.

### **Applied implications**

With the aim of limiting risk behaviours and reinforcing positive health behaviours, the model is very helpful in highlighting areas for potential interventions. Following through the model, a noteworthy area of intervention pertains to the internalization and integration of extrinsically-motivated health behaviours (e.g. eating healthy, exercising, not smoking, etc.) into an individuals' sense of self. This could be accomplished by providing individuals with experiences in which they would: (1) obtain a meaningful rationale of why a certain health behaviour is important, feel they have opportunities for choice and be encouraged to accept more responsibility for the health behaviour; (2) feel they have control over carrying out this behaviour; and (3) have a sense of being related to other people (Deci & Ryan, 2000; Ryan & Deci, 2000; Williams, 2002).

Secondly, one could intervene at the stage of CHB activation. CHBs are not necessarily detrimental to one's health as long as the compensatory behaviour does in fact compensate for the unhealthy behaviour. This generates two separate issues: first of all, wrong beliefs about one's health and inappropriate compensatory behaviours are very detrimental for one's health, whether or not one is self-efficacious. The first step is thus to raise awareness about the process associated with CHBs as well as the frequency of usage of CHBs. Furthermore, cognitive restructuring can be employed to modify dysfunctional beliefs into more adaptive beliefs. Many studies have demonstrated the efficacy of cognitive behavioural therapy (CBT) at improving symptoms through adapting dysfunctional beliefs (Butler & Beck, 2000). Moreover, CBT has now been applied to the domain of health behaviour change with success in areas such as obesity (Cooper & Fairburn, 2001) and smoking cessation (Perkins *et al.*, 2001; Sykes & Marks, 2001). We believe that incorporating the construct of CHBs into a behaviour change intervention based on cognitive behavioural techniques would increase its efficacy. Making people aware of their tendency to use CHBs as a mechanism to carry on with their unhealthy habits and teaching them tools such as cognitive restructuring to alter both the beliefs and the process through which they are used would facilitate behaviour change. Another area of possible intervention is to help people carry out the compensatory behaviour by enhancing their perceived self-efficacy (Schwarzer & Renner, 2000) or by helping them to translate their intentions into actions by designing implementation intentions (Gollwitzer, 1999; Gollwitzer & Brandstätter, 1997; Verplanken & Faes, 1999; Webb & Sheeran, 2003). This would involve teaching people to develop specific plans of when, where, and how they will implement the compensatory behaviours. The ultimate goal of creating implementation intentions is to render the intended behaviour automatic in the presence of the specified situational cues, or in other words, to create a new habit (Gollwitzer, 1999).

In conclusion, the CHB model is valuable not only in furthering the theoretical knowledge of health behaviours, but also at the practical level in terms of highlighting clear testable hypotheses as well as ways of intervening and ultimately improving people's health.

### **Acknowledgements**

Special thanks are expressed to David Zuroff for constructive comments and feedback.

### **References**

- Ajzen, I. (1985). From intentions to actions: A theory of planned behaviour. In J. Kuhl & J. Beckman (Eds.), *Action-control: From cognition to behaviour* (pp.11-39). Heidelberg: Springer-Verlag.

- Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179–211.
- Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions and behaviour. *Social Psychology Quarterly*, 55, 178–204.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. *Psychological Review*, 84, 191–215.
- Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist*, 54, 462–479.
- Baumeister, R. F., Bratslavsky, Muraven, M., & Tice, D. (1998). Ego depletion: Is the active self a limited resource. *Journal of Personality and Social Psychology*, 74, 1252–1265.
- Baumeister, R. F., & Heatherton, T. (1996). Self-regulation failure: An overview. *Psychological Inquiry*, 7, 1–15.
- Baumeister, R. F., Heatherton, T., & Tice, D. M. (1994). *Losing control: How and why people fail at self-regulation*. San Diego, CA: Academic Press.
- Block, L. G., & Keller, P. A. (1998). Beyond protection motivation: An integrative theory of health appeals. *Journal of Applied Social Psychology*, 28, 1584–1608.
- Butler, A. C., & Beck, J. S. (2000). Cognitive therapy outcomes: A review of meta-analyses. *Journal of the Norwegian Psychological Association*, 37, 1–9.
- Cooper, Z., & Fairburn, C. G. (2001). A new cognitive behavioural approach to the treatment of obesity. *Behaviour Research and Therapy*, 39, 499–511.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum.
- Deci, E. L., & Ryan, R. M. (2000). The what and why of goal pursuits: Human needs and the self-determination of behaviour. *Psychological Inquiry*, 11, 227–268.
- DeVries, M. W. (1992). *The experience of psychopathology: Investigating mental disorders in their natural settings*. Cambridge: Cambridge University Press.
- Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.
- Fishbach, A., Friedman, R. S., & Kruglanski, A. W. (2003). Leading us not unto temptation: Momentary allurements elicit overriding goal activation. *Journal of Personality and Social Psychology*, 84, 296–309.
- Giner-Sorolla, R. (2001). Guilty pleasures and grim necessities: Affective attitudes in dilemmas of self-control. *Journal of Personality and Social Psychology*, 80, 206–221.
- Gollwitzer, P. P. (1993). Goal achievement: The role of intentions. *European Review of Social Psychology*, 4, 142–185.
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, 54, 493–503.
- Gollwitzer, P. M., & Brandstätter, V. (1997). Implementation intentions and effective goal pursuit. *Journal of Personality and Social Psychology*, 73, 186–199.
- Hart, E. A. (1993). *The effect of planned exercise as a disinhibitor of dietary restraint: An investigation of perceived control and resultant affect*. Dissertation submitted to the faculty of the Graduate School at the University of North Carolina at Greensboro. Greensboro: University of North Carolina.
- Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as an escape from self-awareness. *Psychological Bulletin*, 110, 86–108.
- Herman, C. P., & Polivy, J. (1980). Restrained eating. In A. J. Stunkard (Ed.), *Obesity* (pp. 208–225). Philadelphia: Saunders.
- Hevey, D., Smith, M., & McGee, H. M. (1998). Self-efficacy and health behaviour: A review. *Irish Journal of Psychology*, 19, 248–273.
- Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, 52, 1280–1300.
- Knäuper, B., Rabiou, M., Cohen, O., & Patriciu, N. (2004). Compensatory health beliefs: Theory and measurement. *Psychology and Health*, 19(5), 607–624.

- Kuhl, J. (1984). Volitional aspects of achievement motivation and learned helplessness: Toward a comprehensive theory of action-control. In B. A. Maher (Ed.), *Progress in experimental personality research*, (Vol. 13, pp. 99–171). New York: Academic Press.
- Kuhl, J. (1994). A theory of action and state orientation. In J. Kuhl & J. Beckmann (Eds.), *Volition and personality* (pp. 9–46). Seattle, WA: Hogrefe and Huber.
- Lowe, M. R. (1993). The effects of dieting on eating behavior: A three-factor model. *Psychological Bulletin*, *114*, 100–121.
- Lowe, M. R., & Timko, C. A. (2004). Dieting: Really harmful, merely ineffective or actually helpful?. *British Journal of Nutrition*, *92*, Suppl. 1, S19–S22.
- Marlatt, G. A., Baer, J. S., Donovan, D. M., & Kivlahan, D. R. (1988). Addictive behaviours: Etiology and treatment. *Annual Review of Psychology*, *39*, 223–252.
- Metcalfe, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review*, *106*, 3–19.
- Mischel, W. (1996). From good intentions to willpower. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behaviour* (pp. 197–218). New York: Guilford Press.
- Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, *126*, 247–259.
- Newcomb, M. D., & Harlow, L. L. (1986). Life events and substance use among adolescents. Mediating effects of perceived loss of control and meaninglessness in life. *Journal of Personality and Social Psychology*, *51*, 564–577.
- Norman, P., Conner, M., & Bell, R. (1999). The theory of planned behaviour and smoking cessation. *Health Psychology*, *18*, 89–94.
- O’Leary, A. (1985). Self-efficacy and health. *Behavioural Research and Therapy*, *23*, 437–451.
- Perkins, K. A., Marcus, M. D., Levine, M. D., D’Amico, D., Miller, A., Broge, M., Ashcom, J., & Shiffman, S. (2001). Cognitive-behavioral therapy to reduce weight concerns improves smoking cessation outcome in weight-concerned women. *Journal of Consulting and Clinical Psychology*, *69*, 604–613.
- Rabiau, M., Knäuper, B., Miquelon, P., & Grouzet, F. (2005, April). Compensatory health beliefs and adherence to self-set diet rules. Poster presented at the Society for Behavioral Medicine (SBM) convention, Boston, MA.
- Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology*, *91*, 93–114.
- Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. R. Cacioppo & R. E. Petty (Eds.), *Social psychology: A sourcebook* (pp. 153–176). New York: Guilford.
- Rogers, R. W. (1985). Attitude change and information integration in fear appeals. *Psychological Reports*, *56*, 179–182.
- Ruderman, A. J. (1986). Dietary restraint: A theoretical and empirical review. *Psychological Bulletin*, *99*, 247–262.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68–78.
- Schwarzer, R. (1992). Self-efficacy in the adoption and maintenance of health behaviours: Theoretical approaches and a new model. In R. Schwarzer (Ed.), *Self-efficacy: Thought control of action* (pp. 217–242). Washington, DC: Hemisphere.
- Schwarzer, R. (1999). Self-regulatory processes in the adoption and maintenance of health behaviours. *Journal of Health Psychology*, *4*, 115–127.
- Schwarzer, R., & Renner, B. (2000). Social-cognitive predictors of health behaviours: Action self-efficacy and coping self-efficacy. *Health Psychology*, *19*, 487–495.
- Shah, J. Y., & Kruglanski, A. W. (2003). When opportunity knocks: Bottom-up priming of goals by means and its effects on self-regulation. *Journal of Personality and Social Psychology*, *84*, 1109–1122.

- Sheldon, K. M. (2002). The self-concordance model of healthy goal-striving: When personal goals correctly represent the person. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 65–86). Rochester, NY: University of Rochester Press.
- Sheldon, K. M., & Elliot, A. J. (1999). Goal striving, need satisfaction, and longitudinal well-being: The self-concordance model. *Journal of Personality and Social Psychology*, *76*, 482–497.
- Sheldon, K. M., & Houser-Marko, L. (2001). Self-concordance, goal attainment, and the pursuit of happiness: Can there be an upward spiral? *Journal of Personality and Social Psychology*, *80*, 152–165.
- Stroebe, W. (2002). Übergewicht als Schicksal? Die kognitive Steuerung des Eßverhaltens [Obesity as fate: The cognitive regulation of eating behaviour]. *Psychologische Rundschau*, *53*, 14–22.
- Sykes, C. M., & Marks, D. F. (2001). Effectiveness of a cognitive behaviour therapy self-help programme for smokers in London, UK. *Health Promotion International*, *16*, 255–260.
- Trope, Y., & Fishbach, A. (2000). Counteractive self-control in overcoming temptation. *Journal of Personality and Social Psychology*, *79*, 493–506.
- Verplanken, B., & Faes, S. (1999). Good intentions, bad habits, and efforts of forming implementation intentions on healthy eating. *European Journal of Social Psychology*, *29*, 591–604.
- Webb, T. L., & Sheeran, P. (2003). Can implementation intentions help to overcome ego depletion? *Journal of Experimental Social Psychology*, *39*, 279–286.
- Williams, G. C. (2002). Improving patients' health through supporting the autonomy of patients and providers. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 233–254). Rochester, NY: University of Rochester Press.

Received 6 August 2005; revised version received 6 December 2004