INDULGING WITH "IMPUNITY": COMPENSATORY INTENTIONS AND DIET-BREAKING BEHAVIOUR

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DEDICATION

To my family

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ABSTRACT

The compensatory beliefs model proposes that when faced with temptation, people form intentions to behaviourally compensate for indulgence. Compensatory beliefs (CBs) are convictions that the consequences of engaging in an indulgent behaviour (eating cake) can be neutralized by the effects of another behaviour (skipping dinner). Compensatory intentions (CIs) are plans to compensate for indulgence that are based on the belief that compensatory behaviours can balance out the effects of indulgence. I propose that compensatory thinking not only exists in dieters but that forming compensatory intentions results in both a decision to indulge and the act of indulging. The first manuscript shows that (1) dieters form compensatory intentions when experiencing the mental conflict of wanting to lose weight but also desiring to eat, and that (2) forming compensatory intentions results in the decision to indulge. These findings suggest that compensatory beliefs and intentions may be useful tools in helping predict whether or not dieters will adhere to their diets. Using experiential sampling methodology, the second manuscript shows that compensatory thinking contributes to the prediction of caloric intake. Implications of using CBs and CIs in weight loss scenarios are discussed, with particular emphasis on how they have been shown to be risky diet tools due to dieters' general failure to follow through with their intentions to compensate.

RÉSUMÉ

Le modèle de convictions compensateur propose que quand fait face avec la tentation, les gens forment des intentions de comportement compenser pour l'indulgence. Les convictions compensatrices sont des convictions que les conséquences de s'engager dans un comportement indulgent (mangeant le gâteau) peuvent être neutralisées par les effets d'un autre comportement (sautillant le dîner). Les intentions compensatrices sont des plans de compenser pour l'indulgence qui sont fondés sur la conviction que les comportements compensateurs peuvent équilibrer - des effets d'indulgence. Je propose que la réflexion compensatrice existe non seulement dans dieters, mais que la formation des intentions compensatrices s'ensuit tant dans une décision de céder que dans à l'acte du fait de céder. Le premier manuscrit montre (que 1) dieters forment des intentions compensatrices en connaissant le conflit mental du fait de vouloir maigrir, mais le fait de désirer aussi manger et (que 2) les intentions compensatrices se formant s'ensuivent dans la décision de céder. Ces conclusions suggèrent que les convictions compensatrices et les intentions peuvent être des instruments utiles dans l'aide prédisent si vraiment dieters adhérera à leurs régimes. En utilisant la méthodologie d'échantillonnage expérimentale, le deuxième manuscrit montre que la réflexion compensatrice contribue à la prédiction de consommation calorique. Les implications de former les intentions compensatrices dans les scénarios de perte de poids sont discutées, avec l'accentuation particulière sur comment les intentions compensatrices ont été

montrées pour être des instruments de régime risqués en raison de l'échec général de dieter à l'achèvement avec leur intention de compenser.

OVERVIEW

This thesis explores a cognitive approach used by dieters to combat temptation: the formation of compensatory intentions. Compensatory intentions (CIs) are plans made in the moment of temptation to make up for indulgence, thereby allowing for indulgence. CIs are based on compensatory beliefs (CBs), which assume that making up for indulgence (by cutting back or exercising) in effect compensates for indulgence (eating a piece of cake). The first goal of this dissertation is to demonstrate that dieters use CIs as an alternative to other cognitive means of negotiating temptation when they are faced with the unique situation of wanting to meet two goals at once, one of high-priority (to lose weight) and one of low-priority (to enjoy high-caloric food). In order to contextualize this framework, a brief review of other means of addressing temptation –including dietary restraint and disinhibition as well as the cognitive functioning behind a reappraisal of the threat harm caused by temptation—is provided. Following this will be a detailed exploration of CIs beginning with a review of the literature on compensatory thinking patterns in health psychology contexts, and continuing with an in-depth analysis of the cognitive mechanisms involved in the formation of a compensatory intention. From here I will present the first of two manuscripts that explore the use of compensatory intentions in dieters. The first manuscript, Temptations Elicit Compensatory Intentions (Kronick & Knäuper, 2010), addresses the first goal of this dissertation by testing the hypotheses that (1) dieters indeed form compensatory intentions when experiencing the mental conflict of wanting to lose weight but also desiring to eat,

and that (2) forming compensatory intentions results in the decision to indulge. Following the first manuscript will be a transition paper in which I discuss how, in addition to the standard scales that assess dieters' tendencies for restraint and disinhibition, CIs may be useful tools in helping to predict whether or not dieters will adhere to their diets. This leads to the second goal of the dissertation: to show that CBs and CIs are valuable tools for the prediction of caloric intake in dieters. In support of this goal, I present a second manuscript, Compensatory Beliefs and Intentions and are Implicated in Caloric Intake of Dieters (Kronick, Knäuper, Auerbach & Stich, under review) that shows, through Experience Sampling Methodology, that CIs and CBs predict caloric intake in dieters, and that, in addition to a tendency to disinhibit, they may be useful in assessing diet adherence. This dissertation will conclude with a discussion about the implication of using CIs in weight loss scenarios and, in particular, how CIs have been shown to be risky diet tools due to dieters' general failure to follow-through with their intention to compensate. The discussion will include a review of institutionalized diet programmes that endorse the ideology of CIs, an exploration of techniques that may be used to convert intentions into behaviours as well as tools such as cognitive behavioural therapy that may identify maladaptive thinking patterns that impede compensatory resolve.

GENERAL INTRODUCTION

Dietary restraint is a self-regulatory process in which individuals attempt to restrict their caloric intake in order to lose weight (Herman & Polivy, 1984). Much of the effort of dietary restraint is made in the face of food temptation, when dieters who are attempting to restrain are torn between adhering to their diet for the purpose of losing weight and satisfying their immediate desire of consuming calorically rich food (Rabiau, Knäuper, & Miquelon, 2006; Stroebe, Mensink, Aarts, Schut, & Kruglanski, 2008). The struggle of temptation creates a conflict in dieters as they experience a dilemma of simultaneously wanting to pursue two incompatible behavioural plans—one involving a high-priority goal of significant long-term gain (to experience the distal satisfaction of losing weight) and one involving a low-priority goal of significant short-term gain (to experience the immediate pleasure of calorically rich food) (Fishbach, Friedman, & Kruglanski, 2003). This discrepancy among cognitions gives rise to a sense of discomfort, typically characterized as cognitive dissonance, as dieters face the difficult decision of reconciling a conflict between the pleasure of indulging and the satisfaction of losing weight (Knäuper, Rabiau, Cohen, & Patriciu, 2004; Rabiau et al., 2006).

Battling temptation with cognitive restraint

If dieters are to meet the high-priority goal of adhering to their restrictive diet plan, they must overcome the desire to meet the incompatible, low-priority goal of enjoying delicious, high-caloric good. In order to achieve this, they need

to activate self-regulatory processes— i.e. processes that increase the self-control required to resist meeting the momentarily salient, but low-priority goal of experiencing immediate pleasure (Baumeister & Heatherton, 1996; Metcalfe & Mischel, 1999; Trope & Fishbach, 2000). One such self-regulatory process involves a deliberate cognitive process–"cognitive restraint"—in which dieters tell themselves that they "cannot" have the tempting food if they wish to meet their weight loss goal (Herman & Polivy, 1980, Stroebe et al., 2008). By cognitively fighting against the conflict-causing factor (the tempting food) and telling themselves they cannot eat, dieters are able to bolster their willpower and ensure that the tempting food no longer poses a threat to the weight loss goal. This depicts the struggle of cognitive restraint, which, when applied rigidly, renounces the immediate gain of a low-priority goal (attaining the pleasure of delicious food) in the name of that of a focal goal (attaining weight loss), thus eliminating the conflict brought on by temptation. Studies have shown that, however, while dieters who restrain their eating for acute periods of time have the ability to successfully restrain their eating in the face of temptation, dieters who develop chronic habits of restraint (such as routinely counting calories and deeming various high caloric/fat foods as forbidden) do not have as much self-control (Herman & Polivy, 1984; Lowe, 1993; Lowe, Whitlow, & Bellwoar, 1991). This appears to be due to the fact that chronic restraining leads to a depletion in the cognitive resources needed to battle temptation. Indeed, recent studies have emphasized the need for cognitive resources (such as alertness and memory) in order to resist temptation. Stroebe et al. (2008) found that restrained eaters who

were able to boost their willpower in the face of tempting food were successful not merely because they were on short-term diets and had cognitive reserves, but because they were able to cognitively access their dieting goal above and beyond the distraction of pleasurable food. In essence, when dieters have cognitive reserves (yet to be depleted from chronic dieting), they can provide what is called a "cognitive shield" over their focal goal of weight loss (Shah, Friedman, & Kruglanski, 2002; Stroebe et al., 2008) and defend against the competing goals of indulgence. This suggests that tempted dieters who cognitively attend to their high-priority goal of maintaining their diets—and who do not cognitively attend to their low-priority goal of pleasure-filled eating—are more likely to resist temptation. However, should a diet be of particular longevity and characterized by increasingly frequent failings, cognitive exhaustion may weaken the ability to summon diet goals in the face of temptation, thereby rendering attempts of restraint in the face of temptation essentially futile. According to this position then, in order to successfully restrain under tempting conditions, acute dieters with sufficient cognitive reserve must recall or invoke diet-goal thoughts, such as "I want to lose weight" or "I will feel good when I lose weight". These thoughts will serve to shield their focal goal and, consequently, work to increase their willpower. Thus it appears that, in the face of temptation, a distinct cognitive process is at work in dieters and that the state of this cognitive process (depleted or not) determines whether or not dieters will successfully use it to recall or invoke diet-goal thoughts so that they may increase their willpower and resist temptation.

Battling temptation by giving in: disinhibition

Of course, as mentioned above, this process of increasing cognitive restraint, and attending primarily to weight loss goals, is, generally speaking, considered to be a laborious process (Fishbach et al., 2003). This seems largely due to the finding that dieters are particularly sensitive to palatable food cues when they are exposed to food that has rewarding qualities. In such a scenario, they are consumed with hedonic thoughts about the food, to the extent that the goal of dieting loses cognitive priority and is replaced by the goal of consuming the pleasurable food (Papies, Stroebe, & Aarts, 2007). In particular, studies have indicated that there are several external conditions that influence whether or not restrained eaters will be lured by food cues only to find themselves de-prioritizing their weight loss goal, releasing their cognitive restraint, and giving into temptation. Among these external conditions are situations in which chronically dieting individuals have been forced to break their diets ("preload condition"; Herman & Mack, 1975; Herman & Polivy, 1980) and have been socially influenced (Haynes, Lee, & Yeomans, 2003; Westenhoefer, Broeckmann, Münch, & Pudel, 1994; Yeomans, Tovey, Tinley, & Haynes, 2004). In such situations, the release of restraint is believed to be activated by a cognitive shift that reflects a collapse of self-control and motivation (Herman & Polivy, 1975, 1980). This is referred to as "disinhibition" because when restrained -- or inhibited -- eaters disengage their self-control and, in effect, *dis*inhibit (Ruderman, 1986), they renounce their high-priority goal in the name of their low-priority goal, which, in effect, disengages their restraint.

While studies have found that this shift from restraint to disinhibition may or may not be activated on a conscious level (Aarts, Custers, & Holland, 2007), overall, it appears to involve a *cognitive* shift from one goal to another (sometimes too fleeting to be aware of), in which dieters neutralize the discomfort of wanting to submit to a low-priority goal by cognitively justifying the release of self-control. Indeed, it has been shown that once dieters violate the rules of their diets with a forced indulgence (preload), they disinhibit because they figure that they have ruined their diet anyway. This distinct cognitive position has been termed the "what-the-hell-effect" (Herman & Mack, 1975) precisely because in the face of temptation, dieters who have already broken their diets choose to view their dieting as a dichotomous function (either on or off) and tell themselves, that once it's "off" they 'might as well' indulge further. They do not consider that a little damage need not be a lot of damage, but instead, decide to make a small infraction bigger so they may more comfortably yield to temptation. Further studies on disinhibition have found that another way in which dieters neutralize the discomfort of engaging in disinhibitory behaviour is by invoking defeatist attitudes about their ability to resist temptation such as "This cake is too hard to resist, I must eat it" (Ogden & Wardle, 1991). Following a preload, Ogden and Wardle (1991) found that dieters formed pre-disinhibitory cognitions of resignation, such as "I'm going to give into any urges I've got" and " I can't be bothered, it's too much effort to stop eating", or defiance, such as "I don't care now. In a rebellious way, I'm just going to stuff my face". Thus, when faced with temptation, in order to remove the conflict of wanting to lose weight and wanting

to satisfy the desire to indulge, disinhibiting dieters justify a disengagement of self-control with either a conscious decision to give in to an overwhelming desire to indulge, or a conscious decision to rebel against their restrictive eating plan.

Battling temptation through re-conceptualization

However, dieters may alleviate the conflict brought on by temptation by giving in to their desire to indulge *without* adopting a detrimental, sabotaging attitude. One way in which they may do this is by re-evaluating or reducing the harm posed by indulgence, so they may indulge (Giner-Sorolla, 2001; Klein and Goethals, 2002; Trope & Fishbach, 2000). Dieters may, in this case, say to themselves, "I don't think 400 calories is so bad. I can eat this cake" and allow themselves to disinhibit. This cognitive strategy involves reconceptualizing the outcome expectancy of their indulgence in such a way that the behaviour assigned to the low-priority goal no longer interferes with the high priority goal (cf. Baumeister & Heatherton, 1996; Giner-Sorolla, 2001; Stroebe, 2002; Trope & Fishbach, 2000) – i.e. believing that the indulgent behaviour is not conflicting with their diet goal. By "minimizing" the damage incurred by the secondary goal (to attain the pleasure of eating high calorie food), dieters reduce the conflict brought on by temptation: They convince themselves that the negative effects of the indulgence are not as pernicious as originally believed and that therefore, they may engage in the desired, indulgent behaviour with relative impunity.

So far, it appears that in order to resolve the cognitive conflict brought on by temptation, various cognitive strategies – resulting in either restraint or disinhibition – are employed. Successfully restraining dieters summon thoughts

that prime the goal of weight loss (e.g. "I will look good in my wedding dress") and disinhibiting dieters invoke ideas of resignation (e.g. "I can't be bothered; it's too difficult") or harm reduction (e.g. "It's only one slice of cake, how bad can that be?"). However, in both scenarios one goal – either the goal of enjoying calorically rich food or the goal losing weight – is not being met. Therefore, while the conflict of temptation is resolved by choosing one goal over the other, so long as both goals are not being met, it is never *satisfyingly* resolved. While it may be the case that, as a result of cognitive dissonance, dieters will not only choose between goals, but convince themselves that their choice was the right one, the solution could be more satisfying if they did not have to choose at all. After all, if dieters choose to restrain, they might feel temporarily proud but also somewhat deprived, particularly when temptation strikes again. If they choose to disinhibit, they might feel satisfied, but the feeling is likely to be temporary once the guilt of having broken their diet sets in and they recognize that they have sabotaged their long-term goal. That is, the struggle of temptation exists precisely because there is a seemingly irresolvable struggle between *two* options (to indulge or to lose weight) and therefore, choosing one goal over another leaves one goal unmet. Both restraint and disinhibition are dichotomous solutions to the conflict of temptation, and neither provide a solution that is amenable to both goals, leading dieters to either break their diets and deprive themselves of a gratifying state of weight loss or avoid eating the tempting food, and deprive themselves of a gratifying indulgence.

Battling temptation by forming Compensatory Intentions (CIs)

Conveniently, for dieters (and eaters who wish to maintain their weight) there is a third option. They may resolve the conflict of wanting to both lose weight and indulge in calorically rich food without sacrificing one goal for another by forming *compensatory intentions* to indulge in the calorically rich food and reduce their calories afterwards. For example, dieters who desire to eat cake may have the thought, "It's okay to have this cake; I will simply eat salad for dinner later". By providing dieters with the option of meeting both goals and not just one, compensatory intentions (CIs) allow dieters to essentially "have their cake and eat it too". CIs permit dieters to behaviourally give in to temptation because, by forming the intention to perform a future compensatory behaviour, they believe that giving in to temptation in the present moment will, ultimately, not compromise their high-priority goal. CIs provide an alternative to the rigid diet strategy of cognitive restraint (which has shown to, over time, weaken a dieter's ability to focus on their weight loss goal) as well as an alternative to the defeatist and self-deceptive paths to disinhibition and instead, alleviate the conflict of temptation with a seemingly harmless and adaptive technique (see Figure 1).

CIs are based on compensatory beliefs (CBs) or compensatory health beliefs (CHBs), which represent attitudes about the enactment and effectiveness of compensation –i.e. that the consequences of engaging in an indulgent behaviour can be neutralized, or cancelled out, by the effects of another behaviour (Knäuper et al., 2004). In order to form CIs one must hold CBs, i.e. believe that the effects of one behaviour (indulging in high-calorie food) can be compensated

by another (cutting back on incurred calories at the following meal or burning the extra calories off through exercise). It should be noted that such beliefs are not limited to the realm of food temptation –indeed, temptations such as smoking, spending money, or drinking alcohol, can inspire compensatory thinking in individuals who hold long-term goals such as remaining healthy, saving for a house, losing weight, or being athletic.

Knäuper et al. (2004) describe a typical CB that dieters may hold when tempted by an enticing piece of cake: On the one hand, dieters know that it is high in saturated fats, cholesterol, sugar and calories and therefore bad for their health, ill-prescribed for their diet and an impediment to the gratification of weight loss. On the other hand, dieters crave the cake and may imagine how good it will taste. Because they are torn between these two conflicting cognitions, dieters may "escape to the belief" that eating the cake is fine provided they eat salad for dinner, thereby compensating for the unhealthy and calorically dense indulgence. By forming a CI, dieters have the intention to eat the cake and then compensate for its consumption later. The planned compensatory act (eating salad for dinner) is used to justify the planned consumption of the cake "now" because consuming a very low calorie dinner (lower than originally intended) should make up for the extra calories consumed when eating the cake. This planned neutralization or balancing of caloric intake serves to justify the indulgence.

While compensatory thinking is a logical part of self-regulation and, in particular, of eating self-regulation (as evidenced by the inclusion of compensatory-intentioned thinking on restraint scales (see Three Factor Eating

Questionnaire; Stunkard & Messick, 1985)), the concept has only recently been established in the field of health psychology. Knäuper et al. (2004) formalized the concept of compensatory thinking in temptation by describing CHBs as being elicited by the cognitive dissonance, or mental conflict, that arises when the pleasure of indulging in a desired behaviour stands in conflict with the potentially negative (long-term) health effects. Rabiau et al. (2006) elaborate on the state of the conflict, suggesting that it involves an interplay between affective states (cravings, anticipated pleasure, desires) and motivation (goals). Recently, Stroebe et al. (2008) have circumvented the affective component of the conflict by describing the same motivational dilemma as stemming from a conflict of goal prioritization –i.e. one in which a high-priority goal is in conflict with a low-priority goal. Compensatory thinking appears then to arise out of the conflict of wanting to meet two goals at once: a low-priority goal driven by the anticipated pleasure of immediate gratification and a high-priority goal driven by the anticipated satisfaction of health benefits and/or positive appearance. The conflict, specific to temptation, is made difficult by the fact that meeting the low-priority, short term goal is easy to achieve and satisfies an immediate craving, while meeting the high-priority, long-term goal is difficult to achieve (in that it involves resisting the low-priority goal) but satisfies a distal and more gratifying pleasure.

To assess the presence of compensatory thinking, Knäuper et al. (2004) created the Compensatory Health Beliefs Scale. The scale has been found to show good validity and reliability. It is comprised of four factors – substance use, eating/sleeping habits, stress and weight regulation. The latter includes items such

as “Breaking a diet today can be compensated for by starting a new diet tomorrow”. Knäuper et al. (2004) include a wide range of health-related situations in which temptation typically arises and for which the use of compensatory thinking would be likely. For each situation compensatory thinking may occur in anticipation to or subsequent to giving into temptation to engage in alluring behaviours that ultimately conflict with long-term goals. Thus there are two distinct types of compensatory intentions – one that is pre-indulgence and one that is post-indulgence. Compensatory thinking that occurs prior to indulgence directly influences one’s choice to engage in indulgent behaviour (“I will eat the cake and then I will cut back later”). This is because the choice to indulge is contingent upon the formation of the compensatory intention –i.e. dieters are allowing themselves to indulge because they have formed the intention to compensate. Were it not for the CI, the dieters might not allow themselves to indulge. This is because CIs that occur prior to indulgence influence whether or not a dieter indulges, and hopefully, compensates for the indulgence at a later point in time with a specified plan. On the other hand, compensatory thinking that occurs following indulgence does not directly influence the choice to indulge as indulgence has already occurred. Thus, the post-indulgent CI only addresses the compensatory plan to make up for the indulgence (“I will cut back later”). Because CIs that are formed prior to indulgence influence the choice to indulge, it is of interest to address these in particular, as the creation of a plan to compensate for an indulgence *so that one may indulge* directly influences the act of indulging, which constitutes diet-breaking behaviour. However, as explored below, CIs are

risky tools for dieters to use. That is, because dieters indulge with the intention to later compensate, it is their responsibility to actually compensate for the indulgence. If they do not manage to do so, then the formation of the CI has lead only to indulgence, thereby serving to break the diet rather than break it *and then* restore it. For this reason, the formation of CIs poses a risk to dieters and, as such, may explain why diets so often fail (please see below for more on the problems associated with forming CIs.)

A breakdown of the conflict leading up to the formation of CIs is described in the Compensatory Health Beliefs Model (Rabiau et al., 2006). It begins with the likelihood of forming a CI, which increases according to the level of satisfaction and desire accompanying the object of temptation. When a low level of satisfaction is expected from the food item (usually rendering it less "indulgent"), it is likely that dieters will be able to resist it. When a high level of satisfaction is expected from the indulgent food item, it is likely that dieters will not resist it and either downgrade the harm imposed by the indulgence (this refers to the same cognitive process described above, involving a reconceptualization of the outcome expectancy of indulgence) or form a compensatory intention. However, if the temptation is of extreme desirability (i.e. has strong, immediately gratifying value), dieters may also adopt a defeatist attitude and engage in disinhibition, particularly if they have been dieting for an extended period of time and/or if they are in a social context and do not have the cognitive strength to stay focused on their primary goal of weight loss (this again, refers to the above described process of disinhibition wherein dieters cognitively abandon their diets

and give in to temptation). In such a case, dieters would not activate CIs as they would have resolved the conflict with the justification of needing to indulge. Thus, the formation of CIs follows an inverted U-shaped function based on the desirability of the temptation and the formation of CIs, where CIs are most likely to be activated by a moderate level of temptation (Rabiau et al., 2006).

Self-efficacy also plays a role in the compensatory beliefs model (Rabiau et al., 2006). Initially, in the face of temptation, high self-efficacy increases the likelihood that diet goals outweigh indulgence goals and the anticipated pleasure of giving into temptation. Under such circumstances, CIs are not expected to be formed as cognitive restraint is used to address the conflict and dieters inhibit indulgence. By the same token, low self-efficacy decreases the likelihood that diet goals outweigh indulgence goals and the anticipated pleasure of giving into temptation. Under such circumstances, CIs are not expected to be formed as disinhibition, and rebellious or defeatist ideation, is used to address the conflict and dieters release their restraint and indulge. However, when self-efficacy is moderate— that is, neither high nor low— the likelihood for a CI to be formed increases, as dieters are of two minds, and believe that it is acceptable to indulge as they will compensate for it later (i.e. they have enough self-efficacy to trust that they will do so).

Other factors have also shown to correlate with the existence of compensatory beliefs. Miquelon, Knäuper and Vallerand (unpublished manuscript) examined the relationships between the motivational determinants and consequences of compensatory beliefs in dieters. They assessed how, in a

weight loss dieting context, two types of motivation –autonomous and controlled—would impact the activation of compensatory beliefs and if the activation of compensatory beliefs, in turn, impacted diet adherence. Defined by Deci and Ryan (1985, 2000) self-determination theory (SDT) describes autonomous motivation as being characterized by the feeling that one has freely chosen to engage in a goal-directed behavior. When motivation is autonomous, behaviors are performed because of strong personal interests or convictions and therefore, feelings of self-control. In contrast, controlled motivation is characterized by engaging in a goal-directed behavior because of interpersonal or even intrapsychic pressures. When motivation is controlled, behaviors are performed because of external pressures or rewards characterized by anxiety and guilt. Deci and Ryan (1985, 2000) suggest that whether or not individuals have autonomous motivation or controlled motivation determines the long-term maintenance of their motivated behavior change. The authors reasoned that if dieters are autonomously motivated to engage in the goal-directed behaviors, then they should feel more personally capable of resisting temptation and therefore not feel the need to apply compensatory thinking in a temptation scenario. In contrast, if their motivation to engage in the goal-directed behaviors is controlled, they should feel less able to resist temptation and more likely to activate compensatory beliefs as a means of addressing the conflict that arises when they are confronted with temptation. To test their hypothesis, Miquelon et al. (unpublished manuscript) assessed compensatory beliefs using the Compensatory Health

Beliefs Scale and found that, indeed, dieters with controlled motivation endorsed more compensatory beliefs than dieters with autonomous control.

The question of whether children hold compensatory beliefs has also been addressed. Using a focus group of children between the ages of 7 and 11 years old, Kamal (2008) assessed whether children hold CHBs across a range of health related behaviours. Results indicated that children appear to use similar reasoning strategies as adults when faced with temptations and, like adults, appear to justify eating calorically rich food with the belief they can make up for it by performing a healthy behaviour later. Specifically, it was found that children hold a number of compensatory beliefs to justify junk food consumption, including beliefs such as *"It doesn't matter if I eat fried food as long as I do lots of sports"; "It is fine to eat fried food as long as I go for a jog or do some skipping"* and *"I can eat junk food today as long as I have a salad or vegetables tomorrow"*. Similar beliefs were identified in relation to the consumption of sweets (*"It's fine to eat sweets or chocolates as long as I have fruit later"* and *"It's fine to eat sweets or chocolates as long as I have vegetables later").* The findings suggest that children adopt similar cognitive reasoning strategies as adults when torn between the high priority goal of being healthy and low-priority goals of enjoying food that is high in sugar and/or fat.

The problem with forming compensatory intentions

It could be argued that forming CIs is, in theory, a viable alternative to restraint in that the follow-through behaviour (i.e. cut back at the next meal) of the

intention makes up for the extra calories incurred by the indulgence, and therefore serves to maintain the dieters' long-term goal of weight loss. However, while dieters may genuinely intend to engage in their compensatory behaviour, many factors, such as decreased motivation, forgetfulness and/or inconvenience, may prevent them from actually performing them. Indeed, a great deal of research demonstrates low correlations between intentions and behaviours (e.g. Johnston, Johnston, Pollard, Kinmonth, & Mant, 2004; Orbell & Sheeran, 1998; Sheeran, 2002). As outlined in the Compensatory Health Belief Model (Rabiau et al., 2006), the difficulty with carrying out compensatory behaviors lies in the fact that dieters must create an *actual* plan to perform the compensatory behavior. In the moment of temptation, the CI is typically formed in haste, without any details of the *how* to follow through with the intended plan. Research has shown that a lack of specific planning hinders the conversion of intentions into behavior (Gollwitzer & Sheeran, 2006). Thus, even if an intention is formed, often individuals do not convert the intention into a compensatory behavior and the goal-discrepant behavior (e.g. eating a piece of cake) is then not balanced out by a compensatory behavior. Of course, it is also possible that individuals do succeed in actually carrying through with the intended compensatory behaviour. However, often the extent of the compensatory behaviour does not suffice to fully compensate for the indulgence (e.g. the amount cutting back in calories at dinner might not be sufficient to balance out the calories consumed when eating the cake). In such a case, dieters weight loss goals will not be met either, as the compensatory behaviour does not neutralize the indulgence. If CIs are formed in dieters, but the

intended plan to compensate for the indulgent behaviour of eating high caloric food is often, despite intentions, not carried out or the compensatory behaviour does not suffice to compensate for the indulgence, then it would appear that CIs are dangerous tools for dieters as they may lead to a failure to meet weight loss goals.

In support of the proposition that CIs are formed but not met, Miquelon et al. (unpublished manuscript) found that the more compensatory dieting beliefs dieters held, the less likely they were to adhere to their dieting rules and, consequently, the less likely they were to reach their weight loss goal. Research on the formation of CBs in other health contexts have also found support for a lack of follow-through in those who form CIs. Knäuper et al. (2004) found that compensatory beliefs were negatively correlated with health-related self-efficacy towards preventive nutrition and alcohol resistance while they were positively correlated with the likelihood of engaging in health-related risk behaviors, the number of illness symptoms reported, and body mass index (BMI). Rabiau, Knäuper, Nguyen, Sufrategui, and Polychronakos (2009) found that adolescents with type 1 diabetes who held compensatory beliefs concerning blood glucose testing (e.g., "I can skip testing my blood glucose now if I do it twice this afternoon" and "Skipping a meal can make up for not taking insulin") showed poorer adherence to diabetes self-care behaviors, such as following a general dietary plan, and poorer blood glucose testing behavior (leading to poorer blood glucose control).

Thus, while the formation of CIs is not in and of itself a risk factor for diet failure, because of dieters' apparent inability to follow through with the intended compensatory behaviour, CIs may do more harm than good. For this reason, it is important to study whether of not dieters do, in fact, form CIs under tempting conditions, believing that they can indulge because they will later make up for it. For if, as we suspect, they "will not" make up for it, CIs could be recognized as potential risk factors for diet non-adherence.

Thesis Objectives

In order to assess whether or not CIs do, in fact, pose a threat to diet-adherence, it is first necessary to demonstrate that dieters do form compensatory intentions in the face of temptation. The first manuscript of this dissertation addresses this issue directly by testing the hypothesis that dieters form CIs when experiencing the conflict of two goals: wanting to lose weight (high-priority) but also desiring to enjoy high caloric food (low-priority). If, as hypothesized, dieters do form CIs when tempted, does this intention lead to the actual decision to indulge? To answer this question, a second hypothesis that tests whether or not the formation of the CI results in the decision to indulge is put forward. The overall aim of the manuscript is thus to demonstrate that CIs are formed by tempted dieters and that these CIs serve to influence dieters' decision to indulge.

MANUSCRIPT 1

TEMPTATIONS ELICIT COMPENSATORY INTENTIONS

Kronick, I. & Knäuper, B. (2010). Temptations elicit compensatory intentions. *Appetite*. *54*(2), April 2010, Pages 398-401.

Abstract

The compensatory beliefs model proposes that when faced with temptation, people form intentions to behaviourally compensate for indulgence. By creating a scenario in which female dieters were either faced with a tempting, high caloric food choice or not, this experiment tested the hypotheses that (1) dieters form compensatory intentions when experiencing the mental conflict of wanting to lose weight but also desiring to eat, and that (2) forming compensatory intentions results in the decision to indulge. Results supported the hypotheses, providing foundational validation for the compensatory beliefs model.

Keywords: Weight loss; Dieting; Self-regulation; Compensatory beliefs; Compensatory intentions; Cognitive dissonance

Introduction

When individuals face the choice between giving in to temptation or preserving an initial goal, they experience a mental conflict. Such a conflict is seen in individuals who seek to lose weight but who are, nevertheless, drawn to the pleasure of consuming high caloric foods (Stroebe, Papies, & Aarts, 2008). The compensatory beliefs model (Knäuper, Rabiau, Cohen, & Patriciu, 2004; Rabiau, Knäuper, & Miquelon, 2006) proposes that people formulate compensatory beliefs as a self-regulatory strategy to alleviate the mental conflict brought on by temptation. Compensatory beliefs are convictions that the negative consequences of engaging in an indulgent behaviour can be neutralized by the positive effects of another behaviour (Knäuper et al., 2004). According to the model, these compensatory beliefs are applied at the moment of temptation, i.e. people form the intention to compensate. For example, people who have the goal to lose weight but the desire to eat sweets may form the intention, "I'll eat this cookie now, but I will cut back later". Compensatory intentions, then, seem to allow individuals to behaviourally give in to temptation because, given that they plan to perform a future compensatory behaviour, they believe that succumbing to temptation now will ultimately not compromise their initial goal (cf. Baumeister et al., 1994).

While individuals may intend to engage in the compensatory behaviour prescribed by the compensatory intention, many factors, such as decreased motivation, forgetfulness and/or inconvenience, can prevent them from actually performing the compensatory behaviour. It is thus not surprising that holding

compensatory beliefs (as measured with the compensatory beliefs scale) has been found to be associated with lower goal achievement (Rabiau, Knäuper, Nguyen, Sufrategui, & Polychronakos, in press; Miquelon, Knäuper, & Vallerand, Note 1). For example, Miquelon et al. found that the more compensatory dieting beliefs dieters held, the less likely they were to adhere to their dieting rules and the less likely they were to reach their weight loss goal. These findings suggest that dieters who use compensatory intentions to regulate temptations may fail to achieve weight loss goals.

The present research aims to specifically determine whether or not dieters form compensatory intentions *before* they indulge. It refers to the common scenario in which dieters have a choice between eating a tempting high caloric food or eating a less tempting low caloric alternative. It should be noted that compensatory intentions may also be formed by dieters following indulgence (e.g. "I can't believe I ate the entire bag of chips – I will skip dinner to make up for it!") or following socially enforced indulgence (e.g. "I have to eat this gigantic piece of Black Forest cake that Auntie Suzie is offering because otherwise she will be disappointed – but I will skip dinner to make up for it!"). In such cases, compensatory intentions are formed as a means of relieving the discomfort of having indulged. However, the present research focuses on scenarios in which dieters face a temptation (eating something delicious but high caloric) and are debating whether to give in to the temptation (and break their diet) or choose a less delicious alternative (and adhere to their diet). We propose that in such scenarios, dieters may form compensatory intentions that allow them to indulge

without thinking they have broken their diet as they have formed the intention to compensate for the indulgence later. We find this type of compensatory intentions to be of particular relevance because it puts dieters into a mind set in which they think they will not break their diet if they eat the high calorie food, leading them to indulge. However, because dieters often do not follow through with their compensatory intentions, the indulgence ends up being a diet violation. If dieters use this strategy often/habitually, it may hinder the attainment of their dieting goal.

This study thus seeks to provide experimental support for the proposition that temptations elicit compensatory intentions. Indirect support for this proposition has been provided by Lowe (1982) and Urbszat, Herman and Polivy (2002) who found that restrained eaters who were asked to taste-test fattening cookies the day before they were instructed to go on a low fat, calorie reduced diet, ate more fattening cookies than participants who were not instructed to diet. I.e. those instructed to diet presumably indulged because they believed that they will compensate for it later by going on a diet. However, in these experiments, the experimenters assessed compensatory *behaviour* in dieters (increased caloric consumption) but only inferred that this behaviour was preceded by the compensatory intention. Therefore, these studies do not provide direct evidence that individuals *actually* form compensatory intentions when confronted with the mental conflict of temptation. It is thus necessary to show that, under tempting circumstances, when a dieter is faced with a mental conflict, he or she will have compensatory intentions, which then permit him or her to indulge.

To this end, we simulated the conditions of a common temptation situation, namely that of dieters fighting the allure of high calorie, high fat food. Specifically, we assessed dieters' thoughts when presented with the choice of eating a delicious looking high calorie cookie or a less attractive low calorie cookie (conflict condition). As a control, a conflict-free condition was created in which the dieters were asked to choose between two low calorie cookies. For both conditions, participants had to choose a cookie that they were made to believe they would have to consume fully. It was hypothesized that, (1) in order to alleviate the mental conflict brought on by contemplating eating the delicious, high calorie cookie, individuals in the conflict condition will report more strongly that compensatory intentions are on their mind than individuals in the conflict-free condition and that, (2) the formation of compensatory intentions, in turn, promotes an indulgent act of eating.

Methods

Participants

The experiment was conducted in a community sample of females currently on a weight loss diet that had lasted for up to a year, and seeking to lose five pounds or more. Participants were recruited through online classifieds and a newspaper advertisement. The study was presented in the ad as "Food Evaluation Study". Participants received $20 for their participation. Ethics approval for the study was received from the McGill University research ethics board. Individuals were screened by phone to determine their eligibility and stratify for age and strength of dieting motivation. The presence of eating disorder symptoms

(assessed with the SCOFF) was an exclusion criterion. Participants had a mean BMI of 24.59 (*SD* = 4.62). Forty-three per cent (18 participants) of the sample had BMIs of 25 of higher.

We stratified for age by recruiting an equal number of participants from four age groups (18-24, 25-40, 41-54, over 55 years). Because the extent to which individuals are inspired to compensate for breaking their diets may vary depending on their motivation to diet, we also stratified for dieting motivation by asking how important it was for them to lose weight (somewhat important, quite important, very important, extremely important). To ensure that participants would be sufficiently hungry to find a cookie tempting, participants were asked to refrain from eating for 2.5 hours before their appointment time. Because the goal of the experiment was to test the hypothesis that the mental conflict of temptation elicits compensatory intentions, we were interested in the compensatory intentions that were endorsed in reference to a high caloric food temptation (the delicious looking cookie). However, four participants referenced the less tempting food choice (the low calorie, unpalatable cookie) for the majority (> 3) of the compensatory intentions and were thus excluded for data analysis from the initial sample of $N = 46$ participants. The sample used for analysis thus consisted of $N = 42$ participants: 21 women in the conflict condition and 21 women in the conflict-free condition. Participants were, on average, 38.29 years old (*SD* = 15.95). Participants reported their race/ethnicity as Caucasian (69%), Asian (14.3%), South Asian (7.1%) or African American (7.1%). The majority of participants were either employed (31%), self-employed (23.8%) or in school/university

(26.2%). Participants, on average, intended to lose 13.01 pounds (*Mdn* = 8 pounds, *SD* = 9.96 pounds, range = 5 to 50 pounds[i]) and had been on their current weight loss diet for an average of 71.83 days (*Mdn* = 49, *SD* = 72.96). Upon arrival, participants' hunger levels were assessed by asking, "How hungry are you right now?" (0 = not at all to 5 = very much). The average reported hunger level was 3.52 (*Mdn* = 3, *SD* = 1.45). The average amount of time since the last meal eaten was 4.44 hours before participating in the experiment (*Mdn* = 3, *SD* = 3.54). There were no significant differences between conflict and conflict-free conditions on the measure of hunger level ($t < 1$), the amount of time since last eaten, $t(40) = 1.33$, $p < .19$, the stratified variable of weight loss motivation, $t < 1$, and the stratified variable of age, $t(40) = 1.45$, $p < .16$.

Experimental Design

Participants were randomly assigned to one of two conditions. In the conflict condition, the cookies were labelled as "Cookie A" or "Cookie B" and "High Calorie (385 calories)" or "Low Calorie (47 calories"). In the conflict-free condition, the cookies were also labelled as "Cookie A" or "Cookie B" but were both labelled as "Low Calorie (47 calories)". The true caloric content of the cookies was irrelevant: A fictitious amount for the low and high calorie cookie (respectively) was chosen by the researchers to convey very low caloric content and very high caloric content (respectively) to the participants. This was to ensure that the participants would correctly perceive the cookies as being low or high in calories.

The label “Cookie A” was always on the left and the label “Cookie B” was always on the right, but the position of the calorie label (left or right) changed accordingly to control for position effects. The conflict-free condition made it necessary that the two cookies appeared different from each other so that the participant would perceive grounds for deliberating between cookies. Thus, participants were presented with a light brown cookie and a dark brown cookie (made with molasses) in both conditions. The position of the dark cookie and the light cookie (left or right) were also counterbalanced to control for position effects. The eight resulting position constellations were randomly distributed to the two conditions.

Procedure

Each participant was run individually and was asked to sit at a table that had two cookies on a tray in front of them. Participants signed an informed consent form explaining that the study involved thinking about the taste of two cookies while deciding which one they would ultimately eat. Participants were informed that they would, (1) fill out a questionnaire about the thoughts they have while deciding which cookie they would be eating, (2) answer a few demographic questions.

Participants were told that we were interested in assessing the palatability and taste of new organic cookies (cover story). In both conditions, participants were told that other participants had said that the high fat, high sugar organic cookies were rich, chewy and delicious tasting while the low fat, low sugar organic cookies were not very good. Participants were asked to make their

decision about which cookie to eat based on the perceived palatability of the cookies. They were told they would have to eat the chosen cookie in its entirety. Participants were then asked to fill out a questionnaire about the thoughts they are having while contemplating which cookie to eat. The questionnaire assessed compensatory intentions, degree of mental conflict and degree of temptation. The experimenter left the room while the participant filled out the questionnaire.

Experimental Materials

The cookies used were home-baked oatmeal cookies and were all the same size and shape. In order to maximize the degree of temptation, we aimed to make the high calorie cookie appear appealing and the low calorie cookie unappealing, while still looking edible. Research has shown that texture of foods varies its palatability (Weiss, 2000). Thus, the low calorie cookie was made to look bland and dry in texture. The basic ingredients of the high calorie cookies included sugar, shortening and oats while the low calorie cookies contained only bananas and oats.

Measures

The items for assessing compensatory intentions, degree of temptation and degree of mental conflict were presented in random order as part of one questionnaire. Seven filler items were embedded within. They consisted of other thoughts one could have about the cookies (for example, "Cookie A [B] smells so good!").

Compensatory intentions assessment. The items assessing compensatory intentions were adapted from Factor IV ("Weight Regulation") of the

Compensatory Health Beliefs Scale (Knäuper et al., 2004). From this, six items were extrapolated that conform to an "in-the-moment" intention to indulge and compensate later: "I'll eat cookie A[B], but then no more cheating on my diet!"; "I'll eat cookie A[B], but eat less at my next meal"; " I'll eat cookie A[B]; it'll be my next meal"; "I'll eat cookie A[B], but I'll have only salad for my next meal"; "I'll eat cookie A[B], but then eat less tomorrow to make up for it"; "I'll eat cookie A[B], but I will cut back later". The questionnaire asked participants to rate the extent to which these intentions were on their mind while contemplating whether or not to eat the high calorie food (1, a little bit on my mind, to 4, very much on my mind). The average endorsement of having compensatory intentions on one's mind was calculated and served as index of compensatory intentions. The internal consistency of this index was high (Cronbach's alpha = .81).

Temptation. As a manipulation check, we assessed the degree to which participants were tempted by the cookies. Three items were used for this purpose: "I want cookie A [B] a lot"; "Cookie A [B] looks crunchy"; "I'll eat cookie A [B], it looks yummy"). The same response scale as for the assessment of compensatory intentions was used. The internal consistency of this index was moderate (Cronbach's alpha = .71).

Degree of mental conflict: Also as a manipulation check, we assessed the degree of perceived mental conflict, using two items: "I would feel guilty eating cookie A [B], but it looks delicious"; "I want cookie A [B], but I really should not have it". Again, the same response scale as for the assessment of compensatory

intentions was used. The internal consistency of this index was moderate (Cronbach's alpha = .75).

Results

Manipulation checks. We first tested whether, indeed, the conflict condition induced more temptation and mental conflict than the conflict-free condition. Results showed that dieters indeed felt more tempted in the conflict condition than in the conflict-free condition, $M = 2.79$ ($SD = 0.76$) vs. $M = 2.21$ ($SD = 0.83$), $t(40) = 2.40$, $p < .021$, and felt a higher mental conflict in the conflict condition that in the conflict-free condition, $M = 3.10$ ($SD = 0.83$) vs. $M = 1.79$ ($SD = 0.73$), $t(40) = 5.43$, $p < .001$.

Compensatory intentions. A *t*-test was then performed to test the hypothesis that dieters in the conflict condition would demonstrate stronger endorsements that compensatory intentions are on their mind than those in the conflict-free condition. Results indicated that indeed the average compensatory intention endorsement was higher in the conflict condition ($M = 2.39$, $SD = 0.87$) than in the control condition ($M = 1.89$, $SD = 0.56$), $t(40) = 2.23$, $p < .032$. These data are consistent with the hypothesis that compensatory intentions are formed as a reaction to the mental conflict experienced in temptation situations[2] (see Figure 2).

Cookie choice. We next examined whether compensatory intentions predict whether a person chooses the high or the low calorie cookie. The sample for this analysis is limited to the 21 participants in the conflict condition because only they had a choice between a high and a low calorie cookie (in the conflict-

free condition, both cookies were low calorie and participants decided between dark and light colour of cookie).

Nine out of the 21 participants in the conflict condition chose the high calorie cookie. To test whether endorsing compensatory intentions when being tempted by a high calorie food item was associated with choosing this item for consumption, we entered the compensatory intentions variable into a logistic regression analysis predicting which cookie (low or high calorie) the dieters chose for consumption. Given that food consumption (or, commitment hereto) is a complex behaviour that is determined by many other factors aside from being tempted, we reasoned that the following variables (previously found to be associated with high caloric food consumption) warranted control: (1) time of day (e.g. DeCastro, 2006), (2) ability to adhere to their diets (as measured by "How much do you feel you have been able to adhere to your weight loss goal?") (e.g. Alhassan, Kim, Bersamin, King, & Gardner, 2008), (3) the tendency to disinhibit when faced with food stimuli (e.g. Bryant, King, & Blundell, 2008), (4) dislike of cookies (as measured by the endorsement of the statement: "I don't like cookies" on a 4-point scale) as a signifier of a lack of desire for food not liked (e.g. Booth, 1990) and (5) length of diet as a proxy measure for poor dieting self-efficacy (Del Corral, Chandler-Laney, Casazza, Gower, & Hunter, 2009).

The results of this regression model showed that compensatory intentions were a significant predictor of choosing the high calorie cookie for consumption, $B = 3.40$, $SE = 1.78$, Wald = 3.87, $p < .05$.

Discussion

The results of this experiment are consistent with the hypothesis that the mental conflict of being torn between giving in to a food temptation or preserving an initial dieting goal elicits compensatory intentions. We found that dieters who deliberated eating a delicious looking, high calorie cookie (rather than an unpalatable, but low calorie cookie) endorsed more strongly that compensatory intentions were on their mind than dieters who were not presented with this mental conflict. In addition to this finding, we found support for the proposition that the existence of compensatory intentions is related to choosing a high calorie cookie to eat. This suggests that by using compensatory intentions as a strategy to cope with temptations, individuals may allow themselves to indulge. Previous studies (Miquelon et al., Note 1; Rabiau et al., in press) had found a relationship between holding compensatory beliefs (as measured by the compensatory beliefs scale) and engaging in indulgent behaviour. However, this is the first study to show that temptations elicit compensatory intentions and that these, in turn, are associated with the decision to indulge.

While it is possible that compensatory intentions were formed after having made the decision to succumb to temptation (suggesting that the decision to eat the high calorie food inspired the formation of the compensatory intention), we explicitly provided the following statement prior to assessing participants' thoughts to assure that they would report on the thoughts they were having while debating which cookie to eat: "We are interested in knowing what goes through your mind while deciding which of the two cookies you would like to eat".

Additionally, we provided the following instructions: “Please fill out this questionnaire about the thoughts you have while deciding which cookie you are going to eat. On the questionnaire, you’ll have to write in “cookie A” or “cookie B” for each thought, and circle how much the statement pertains to the cookie. You do not have to commit to one cookie or the other until the end of the questionnaire when you will be asked to eat the entire cookie.” Of course, despite this, we can not be certain that all participants followed these instructions and actually reported their thoughts while debating the two choices. However, we intentionally made the choice for them particularly difficult i.e. they were faced with a choice between two trial cookies: one 385-calorie, “rich, chewy and delicious” cookie and one 47-calorie, “not very good-tasting”, bland and dry-textured cookie. This way, the participating dieters had to seriously deliberate about their choice before arriving at their ultimate decision.

If dieters choose to indulge in high-calorie food with the plan to later compensate for the extra calories, and then *succeed* in following through with the plan to compensate for the indulgent behaviour, the use of compensatory intentions would actually not hinder the achievement of dieting goals. Indeed, in such a case, the use of compensatory intentions provides a desirable level of flexibility within otherwise rigid dieting parameters. However, there is always a chance that individuals will ineffectively follow through on their compensatory plan (e.g. not cut back sufficiently at the next meal to make up for the extra calories indulged) or not follow through at all. Some of the reasons why dieters may not follow through include a lack of knowledge of calories in foods that may

result in a dieter incurring a caloric deficit that is less than the excess incurred (not cutting back enough), forgetfulness about compensating, and procrastination resulting in decreased motivation to exert the compensatory restraint at the later time. Certainly, given the notoriously low correlation between intentions and behaviour (Sheeran, 2002), it may be said that forming intentions to compensate may be a dysfunctional tool for reaching goals.

By specifically highlighting the use of compensatory intentions in tempting food situations, this study draws attention to an insidious cognitive strategy used by dieters. While compensatory intentions may provide individuals with a valid license for indulgence, if the compensatory intentions prescribed in the beliefs are not coupled with robust implementation strategies, they may be responsible for sabotaging successful goal attainment. Dieters should be more aware of their tendency to forming compensatory intentions and recognize how these maladaptive thoughts need to be coupled with robust implementation strategies. Indeed, many studies have demonstrated the efficacy of cognitive behavioural therapy (CBT) at restructuring maladaptive or dysfunctional beliefs (Butler & Beck, 2000). Alternately, it may be argued that because it is likely that adherence to compensatory intentions is problematic in dieting, individuals who seek to successfully adhere to weight loss goals may want to be very prudent, and avoid using compensatory intentions altogether.

Footnotes

[1]Additionally, we ran the analyses without the participant who wanted to lose 50 pounds and the results remain unchanged. We therefore included the participant in the analysis.

[2]One may wonder whether prompting participants with pre-worded compensatory intentions directs their thinking to the extent that these individuals might not have compensatory intentions in the absence of such prompting. Monson, Knäuper and Kronick (2008) addressed this question in a pilot study in which they administered a free-write questionnaire to participants in a conflict and a conflict-free condition. Forty percent of the participants in the conflict condition had unprompted compensatory intentions while none of the participants in the conflict-free condition did.

TRANSITION

While it has been shown that Compensatory Intentions (CIs) are formed by dieters who face temptation, other cognitive processes, namely those that underlie cognitive restraint and disinihibition, have typically been identified for managing the conflict of temptation. An exploration of the various mechanisms by which dieters manage temptation provides a lens into the reasons why dieters are able (or not able) to limit their food intake, and achieve (or fail to achieve) their weight loss goals. Ultimately, it is of interest to ask: Which of the cognitive processes used for managing temptation predict caloric intake and which do not? However, before addressing this question, an overview of the cognitive processes that have been previously identified for the purpose of weight management and assessment will be provided.

Cognitive Restraint and Behavioural Restraint

Primarily, it has been found that dieters try to resist the urge to indulge by implementing cognitive restraint— the use of a conscious effort to resist temptation (Herman & Mack, 1975). To assess the impact of such cognitive processes on dieting behaviour and, in particular, caloric intake, psychometric scales have been developed. The two principle measures of restraint, The Restraint Scale (RS; Herman & Polivy, 1980) and the Three Factor Eating Questionnaire-Restraint (TFEQ-R; Stunkard & Messick, 1985) are used to measure restraint attitude and behaviours. By addressing the conscious effort involved in dietary restraint, the restraint scales highlight the cognitive process

involved in restricting food intake when on a weight loss diet. The following items are specifically used to measure the degree of cognitive (or "conscious") restraint: "Do you give too much time and thought to food?", "How conscious are you of what you are eating?", "I deliberately take small helpings as a means of controlling my weight", "I often stop eating when I am not really full as a conscious means of limiting the amount that I eat", "I consciously hold back at meals in order not to gain weight" and "[Are you] constantly limiting food intake, never 'giving in'?".

But does the process of trying to restrain (as it is assessed by the restraint scales) influence the act of limiting food intake? The question of whether cognitive restraint has a direct impact on behavioural restraint—i.e. the behavioural commitment to not-eat food that is prohibited by a weight loss regiment— has been empirically investigated as part of testing the concurrent validity of restraint scales. Over the years, however, many authors have noted that the behavioural tendency to restrain has proven to be a complex and elusive construct, more difficult to validly capture than originally believed (for a review, see Kronick & Knäuper, 2007). Some studies have focused on the TFEQ-R have found the scale to be inversely related to caloric intake (as measured by food diaries or the food frequency questionnaire (FFQ, Block, Hartman, Dresser, Carroll, Gannon, & Gardner, 1986)), thus suggesting that cognitive restraint (as it is portrayed by the scale) is predictive of caloric intake (French et al., 1994; Janelle & Barr, 1995; Laessle et al., 1989). However, there is evidence that self-report monitoring systems used for caloric intake such as food diaries or the FFQ

may be unreliable (Bathalon, Tucker, Hays, Vinken, Greenberg, McCrory, & Roberts, 2000). Indeed, it has been found that underreporting poses a significant degree of error in the approximation of energy intake (Asbeck, Mast, Bierwag, Westenhofer, Acheson, & Muller, 2002) – an estimated underreporting of 20-50% (Lichtman et al., 1992; Livingstone, Prentice, & Strain, 1990). It is thus unclear whether the result of a negative correlation between scores on the TFEQ-R and self-reported caloric intake simply reflects that weight loss dieters want to keep up the self-image that they are successfully restricting their caloric intake or whether they are, in actuality, behaviourally exerting caloric restraint.

The question of whether cognitive restraint translates into behavioural restraint has not been much clearer from studies using the Restraint Scale (RS). While the RS has been shown to predict caloric intake, it has done so only in experimental settings where, after having been forced to break their diets, chronic dieters further disengage their restraint ("disinhibit"), thus increasing (and not, as would be predicted, decreasing) their caloric intake (Herman & Mack, 1975). In an effort to clarify the question of whether individuals who cognitively restrain are likely to behaviourally restrain, researchers recently set out to re-test the concurrent validity of the RS and the TFEQ-R and found that neither scale was associated with acute or long-term reduction in caloric intake (Stice, Cooper, Schoeller, Tappe & Lowe, 2008; Stice, Fisher & Lowe, 2004;).

Mixed and confounding findings have led researchers to question the measurement of restraint as a whole. As a means of explaining the restraint scales' lack of validity, I argue that the cognitive processes underlying restraint

are not sufficiently elaborated in the restraint scales. Specifically, because cognitive restraint is a *cognitive* process, a restraint scale that includes some of the actual cognitions held by dieters when engaged in the *process of restraint* may more closely approximate the experience of restraint in dieters. Specifically, including items such as [*How often do you think] "I shouldn't, it will break my diet" and "No, I will not give in"* might capture the conscious thoughts of restraint in dieters as they attempt to resist temptation. Perhaps, if the driving cognitions of restricting caloric intake were properly captured in scales assessing restraint, there would be more concurrent validity between scale (representing attitude and *specific* cognitive processes) and behaviour.

Cognitive disinhibition and the release of restraint

Restrained eaters are believed to engage in a cycle of dieting and periodic overindulging where, in the face of temptation, their self-control is often temporarily released by certain cognitions (Herman & Polivy, 1980; Ruderman, 1986). This typically occurs if restraint is not strong enough to battle temptation (please see Introduction for a discussion on the depletion of restraint). In such situations, other cognitive processes overwhelm those of restraint and are engaged to manage temptation. For example, it has been found that dieters who experience a depletion in restraint experience the "what-the-hell effect" (Herman & Mack, 1975) as a means justifying their inability to resist temptation prior to disinhibiting (behaviourally releasing their restraint). This cognitive process, which essentially "allows" for dietary abandon (in the name of a "why not?" attitude), has been repeatedly demonstrated in chronically restraining dieters who

release their restraint in the face of indulgence after having been forced to break their diets (Herman & Polivy, 1984; Lindroos et al., 1997; Lowe, 1993; Lowe, Whitlow, & Bellwoar, 1991; Ouwens, van Strien, & van der Staak, 2003; van Strien, Cleven, & Schippers, 2000; Westenhoefer, Broeckmann, Münch, & Pudel, 1994). The effect is generally considered to have an impact on restrained eaters who have been "preloaded" (asked, under experimental conditions, to break their diets on high caloric foods for the purposes of a study) due to a specific cognitive state of abandon occurring in dieters that have just broken their diet plan—i.e. the implicit ideation of "what the hell, *I've already ruined my diet*". This highlights the specific role of cognitions in disinhibition, without which dieters would not feel justified to engage in the goal-dystonic act of succumbing to indulgence. Indeed, dieters must not have already sabotaged their diets in order to "give-in" in the face of temptation. Under certain circumstances, dieters with depleted restraint have been shown to experience other cognitive processes when tempted. Such circumstances, including diet chronicity, emotional eating (Herman, Polivy. Lank & Heatherton, 1987) and social eating (Clendenen, Herman & Polivy, 1994), have been found to predict acts of disinhibition (Westenhoefer, Broeckmann, Münch, & Pudel, 1994). Thus, it is in these situations that dieters who are tempted will typically form a thought that allows them to disengage from their restraint. For example, Ogden and Wardle (1991) found that disinhibiting eaters formed defeatist and defiant attitudes about the ability to withstand temptation (i.e. "This cake is too hard to resist, I must eat it"). Such thinking is instrumental in "allowing" dieters to indulge and thus play a pivotal role in disinhibition.

The act of disinhibiting does not require mental exertion but, rather, justification for releasing restraint and engaging in behaviour that conflicts with an initial weight loss goal. The TFEQ-Disinhibition (TFEQ-D) assesses the tendency to disinhibit by providing items that represent the behaviours prompted by a conscious decision to release restraint. Such representation can be found in items such as "While on a diet, if I eat food that is not allowed, I often then splurge and eat other high calorie foods", "Do you…Often limit food intake, but often 'give in'?", "Being with someone who is eating often makes me hungry enough to eat also" , "When I feel lonely, I console myself by eating" and "Being with someone who is eating often makes me hungry enough to eat also". In circumstances that have been found to be associated with disihibitive eating, the TFEQ-D has proven to be predictive (Westenhoefer, Broeckmann, Münch, & Pudel, 1994).

Compensatory beliefs and the release of restraint

The question of whether two cognitive processes–cognitive restraint and disinhibition—predict caloric intake has been abundantly addressed by researchers. However, whether the cognitive process of forming compensatory beliefs and intentions impact caloric intake has not been assessed. Kronick and Knäuper (2010) found that dieters who are tempted form compensatory intentions in an effort to balance the conflict of wanting to indulge and wanting to remain on their weight loss diets. Does compensatory thinking—i.e. planning to indulge now with the intent of making up for it later—influence whether or not dieters engage in indulgent behaviour? In the following manuscript, this question is explored.

MANUSCRIPT 2

COMPENSATORY BELIEFS AND INTENTIONS CONTRIBUTE TO THE PREDICTION OF CALORIC INTAKE IN DIETERS

Kronick, I., Auerbach, R., Stich, C., & Knäuper, B. (under review). Compensatory Beliefs and Intentions Contribute to the Prediction of Caloric Intake in Dieters. *Appetite.*

Abstract

One cognitive process that impacts dieters' decision to indulge is the activation of compensatory beliefs. Compensatory beliefs (CBs) are convictions that the consequences of engaging in an indulgent behaviour (eating cake) can be neutralized by the effects of another behaviour (skipping dinner). Using experience sampling methodology, the present study hypothesized that, in addition to the cognitive processes associated with restraint and disinhibition, compensatory thinking contributes to the prediction of caloric intake. Specifically, in a population of 67 dieters, we examined whether main effects for RS, TFEQ-R, TFEQ-D, CB, and CI predicted changes in number of portions eaten. Results indicated that higher scores on CB, CI and TFEQ-D predicted a greater number of portions eaten signifying that, along with disinhibition, compensatory thinking predicts caloric intake in dieters.

Keywords: Compensatory Beliefs, Compensatory Intentions, Restraint, Disinhibition, Caloric Intake, Experience Sampling Methodology

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Introduction

Studies have shown that dieters' restraint is depleted by the cognitive burden of prioritizing weight loss goals over the lures of indulgence (Fishbach, Friedman, & Kruglanski, 2003). In the face of temptation, this cognitive burden often becomes too great to uphold and dieters begin to de-prioritize their weight loss goals. However, because a de-prioritization of weight loss goals is goal-dystonic for dieters, they experience a conflict when wanting to break their diets while still wanting to lose weight (Knäuper, Rabiau, Cohen, & Patriciu, 2004; Rabiau, Knäuper, & Miquelon, 2006). To neutralize this conflict, dieters need to justify the release of restraint with cognitive processes that "allow for" indulgence. One such cognitive process, the "what-the-hell effect" (Herman & Mack, 1975), has been repeatedly demonstrated in chronically restraining dieters who consciously disinhibit (release their restraint) as a means of indulging (Herman & Polivy, 1984; Lowe, 1993; Lowe, Whitlow, & Bellwoar, 1991). Other cognitive processes have been found in dieters with the tendency to disinhibit. For example, Ogden and Wardle (1991) found that disinhibiting eaters formed defeatist and defiant attitudes about the ability to withstand temptation (i.e. "This cake too hard to resist, I must eat it"; "I don't care now. In a rebellious way, I'm just going to stuff my face") that "permitted" them to disengage their restraint and indulge.

Another cognitive process that impacts dieters' decision to indulge is the activation of compensatory beliefs (Knäuper, et al., 2004; Rabiau et al., 2006). Compensatory beliefs (CBs) are convictions that the negative consequences of

engaging in an indulgent behaviour (e.g. eating high caloric food) can be neutralized by the positive effects of another behaviour (e.g. skipping dinner). CBs allow dieters the "right" to indulge by offering the "promise" to compensate for the indulgence at a later point in time. Dieters who hold such beliefs may, in the moment of temptation, form the intention, "I will eat less at my next meal so that I can eat this cake now." In support of this proposition, Kronick and Knäuper (2010) found that dieters indeed form compensatory intentions (CIs) when confronted with the choice between tempting, high caloric food and un-tempting low caloric food, and that forming CIs resulted in choosing tempting, high caloric food in spite of their diets. They concluded that dieters who form CIs (thus allowing themselves to indulge "now" with the plan to make-up for it "later") are at higher risk of giving into temptation –and incurring extra calories –than those who do not. However, while Kronick and Knäuper (2010) found that the formation of CIs in dieters prompted the *choice* of an indulgent food over a non-indulgent food, they did not test whether or not CIs prompted the actual *consumption* of indulgent food. Testing whether or not the formation of CIs predicts an increase in caloric intake is necessary, as such an increase would suggest that CIs elicit diet-breaking behaviour in dieters and are thus detrimental to the pursuit of weight loss.

Using experience sampling methodology (ESM; DeVries, 1992), in which dieters were asked to self-report their caloric intake and their formation of CIs up to seven times a day for seven days, the present study sought to test if, for dieters who face inevitable temptations over the course of the day, compensatory thinking

(which "allows for" indulgence) is predictive of caloric intake. Specifically, it is hypothesized that, in addition to the cognitive processes associated with the tendency to restrain (which is often depleted over time in dieters) and the consequential tendency to disinhibit, the tendency to hold compensatory beliefs and form compensatory intentions contributes to the prediction of caloric intake in dieters.

Methods

Participants. Seventy-eight participants were recruited through fliers posted in different locations on the McGill University campus and through advertisements on university affiliated websites. The fliers sought individuals who are currently on a diet to lose weight. Because the aim of the present research was to investigate eating behaviour in a non-clinical population, four participants were excluded from data analyses because their BMI indicated that they were morbidly obese (BMI > 40; for three participants) or underweight (BMI < 18.5; for one participant). Five participants were excluded from data analyses because they responded to less than half (i.e. 24) of the ESM questionnaires and/or they responded to the questionnaires on fewer than five days. Thus, the sample used for data analysis consisted of 69 participants (60 women, 9 men) ranging from 18 to 42 years of age (M = 21.97, SD = 3.72). The BMI had a mean of 24.17 (SD = 3.37).

Procedure

Participants read and signed a consent form before attending a forty-five

minute training session during which they filled out the questionnaire booklet of all "Level 2" measures (see below). Level "2" measures were taken at Time 1 only (as opposed to "Level 1" measures which were taken at episodically). Participants were trained to handle the personal digital assistants (PDAs) used to collect the ESM data. Their weight and height was then measured for determining BMI. Once they had filled out the questionnaire booklet, participants received a PDA for seven days. The PDA was used to assess the relevant situation specific variables. It automatically recorded the specific time and date of each entry. The PDAs were programmed to beep randomly for seven days, seven times a day, between 10am and 11pm for seven consecutive days. A PDA beeped three times at a 5-minute interval for each of the scheduled times, i.e. participants were given three cues to respond to any given prompt ("Level 1" measures). Participants were given a written set of instructions in the form of a trouble-shooting guide to take home.

Participants were instructed to return to the laboratory eight days later in order to return the palm pilot and receive 20 dollars compensation for their participation.

Measures

Compensatory Intentions (Level 1). To measure the formation of compensatory intentions, the handheld computers presented the following questions with regards to the dieters' most recent eating episode: "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?". Response options ranged from 1 ("not at all") to 7 ("very much").

Caloric Intake Variable (Level 1). "Number of portions of low/high caloric food eaten", was created by multiplying responses to two questions, "perceived caloric content of the consumed food" and "number of portions eaten". "Perceived caloric content of the consumed food" was assessed through the question: "Was this a healthy food (low fat or sugar) or an unhealthy (high fat or sugar) food?". Portion size was considered to be relative and the absolute portion size was not relevant to the study goal. We were interested in seeing if dieters who formed a CI would consume more portions of their usual portion size in a given eating episode, whatever the absolute portion size might be. Response options ranged from 1 (for "very healthy, very low fat or sugar") to 5 ("very unhealthy, very high fat or sugar"). "Number of portions eaten" was assessed through the question "How many portions of this food did you eat?" Response options provided were "half-portion or less", "1 portion", "1.5 portions", "2 portions", "2.5 portions", "3 portions". The responses were coded 1 to 6, respectively. The higher the score on the combined variable (which could range from 1 to 30) the higher the individuals' total caloric intake within an eating episode.

Compensatory Beliefs (Level 2). The Compensatory Health Beliefs Scale (Knäuper, Rabiau, Cohen, & Patriciu, 2004) was used to assess compensatory beliefs. This scale has been validated in the general population and has been found to show good internal consistency ($\alpha = .80$) (Knäuper et al., 2004). It

assesses various compensatory beliefs related to substance use (e.g., smoking, drinking alcohol), unhealthy sleeping and eating habits, stress, exercise, and weight regulation. In their study, Knäuper et al. (2004) found that these various types of compensatory beliefs were negatively correlated with health-related self-efficacy towards preventive nutrition and alcohol resistance while they were positively correlated with the likelihood of engaging in health-related risk behaviors, the number of illness symptoms reported, and body mass index (BMI). Knäuper et al. (2004) also showed that compensatory beliefs were distinct from similar constructs, such as irrational health beliefs. In the present sample, the scale also has a good internal consistency ($\alpha = .84$).

Three Factor Eating Questionnaire-Restraint (Level 2). The TFEQ-R (Stunkard & Messick, 1985) is the restraint subscale of the TFEQ. It has a moderate alpha in the present sample (TFEQ-R: $\alpha = .78$).

Three Factor Eating Questionnaire -Disinhibition (Level 2). The TFEQ-D (Stunkard & Messick, 1985) is the disinhibition subscale of the TFEQ. It has a moderate alpha in the present sample (TFEQ-D: $\alpha = .74$).

The Restraint Scale (Level 2). The RS (Herman & Mack, 1975; Herman & Polivy, 1980) is a 10-item scale for assessing chronic restraint. The RS has a moderate alpha in the present sample (RS: $\alpha = .63$).[1]

Results

Data from Experience Sample Method (ESM)

ESM analyses were conducted in HLM (Bryk & Raudenbush, 1992) using maximum likelihood computation. An experience sampling questionnaire episode was excluded from data analysis if participants (1) answered before monitoring hours, (2) answered later than one hour after the last pre-programmed signal or (3) answered a given beep multiple times. To examine our proposed hypotheses, we utilized multilevel modeling. Analyses were based on 1229 eating episodes with 67 individuals (data from two participants was excluded given that they failed to complete individual difference measures) and were conducted using SAS (version 9.1) mixed procedure and maximum likelihood estimation. With regards to centering, Level 1 variables were within person centered as we were examining idiographic fluctuations of our dependent variable (i.e., centered at each individual's mean). Level 2 variables, or between subject variables, were standardized. Please see Table 2 for the Intraclass correlation coefficients for all Level 1 variables and Table 3 for the correlation matrix of all variables assessed at the initial assessment (i.e., bivariate Pearson correlations for Level 2 variables).

RS, TFEQ-R, TFEQ-D, CI, and CI Predicting Number of Portions Eaten

We examined whether main effects for RS, TFEQ-R, TFEQ-D (i.e., Level 2 variable), CB (i.e., Level 2 variable), and CI (i.e., Level 1 variable) predicted changes in caloric intake (i.e. Level 1 variable). The results with respect to the fixed-effects component of the model are presented in Table 2. The compound symmetry covariance structure ($r = 1.65$, $p < .01$) and random intercept ($r = 0.28$,

$p < .001$) were significant and thus retained in the model. Of primary importance, higher scores on CB, CI and TFEQ-D predicted an increase in caloric intake. At the same time, neither RS nor TFEQ-R emerged as a significant predictor of caloric intake.

Discussion

Using experience sampling methodology (ESM; DeVries, 1992), the present study found that holding compensatory beliefs (CBs) and forming compensatory intentions (CIs) are predictive of caloric intake in dieters. The findings suggest that CBs and CIs prompt the consumption of indulgent food in dieters, thereby eliciting diet-breaking behaviour. In addition to compensatory cognitive processes, disinhibitory cognitive processes also significantly contributed to the increase of caloric intake, while the process of cognitive restraint did not. This suggests that the caloric intake of dieters is significantly influenced by the compensatory thinking (i.e. "I can indulge now because I will make up for it later") that is rooted in beliefs about the use and efficacy of compensatory strategies. Additionally, it is in line with the large literature that suggests that the caloric intake of dieters is influenced by the tendency to disinhibit (Lindroos et al., 1997; Ouwens, van Strien, & van der Staak, 2003; van Strien, Cleven, & Schippers, 2000; Westenhoefer, Broeckmann , Munch, & Pudel, 1994), and the thinking that necessarily instigates the release of restraint ("what the hell"; "I cannot resist"). Surprisingly, the tendency to restrain did not significantly predict caloric intake in dieters despite the fact that disinhibitory tendencies are associated with the tendency to restrain (Stunkard & Messick,

1985). The lack of significance is possibly explained by recent studies that have found a lack of predictive validity in RS and TFEQ-R (see Stice, Cooper, Schoeller, Tappe, & Lowe, 2008; Stice, Fisher, & Lowe, 2004).

While disinhibitory tendencies and thoughts represent a weakening and acquiescence on the part of dieters, compensatory beliefs and intentions offer dieters the "best of both worlds"—the release of restraint followed by the promise of restraint— to balance out the impact of diet-breaking behaviour. This study is the first of its kind to directly implicate compensatory thinking in the cognitive process that allows dieters to indulge. Of course, while diet-breaking behaviour in and of itself can be detrimental to weight loss, an increase in caloric intake on the part of dieters who form compensatory intentions is problematic if the extra calories incurred are *not* compensated for (with restrained eating or exercise). Indeed, evidence suggests that when it comes time to compensate for indulgences, the majority of dieters who have formed compensatory intentions fail to follow through with their plan to compensate (Rabiau, Knäuper, Nguyen, Sufrategui, & Polychronakos, 2009; Miquelon, Knäuper, & Vallerand, unpublished manuscript). This implies that holding compensatory beliefs and forming compensatory intentions presents a risk factor for diet-nonadherence, as a plan to compensate for indulgence leads to diet-breaking behaviour *without* recovery, and thus a sustained –and not temporary— increase in caloric intake.

Limitations

This study had several limitations. Firstly, the gender composition of the sample was exclusively female. Future research should examine whether the results generalize to male dieters. Secondly, there were no measures of restraint or disinhibition at Level 1, while there were measures of compensatory thinking at both Level 1 and 2. Indeed, it would have been ideal to have compared restraint, disinhibition and CIs within-level as well as between-level. It may be interesting to have single-question measures for these constructs developed for this purpose.

Finally, this study focused exclusively on the question of whether or not the existence of CBs and formation of CIs are predictive of caloric intake in dieters. However, this is only part of the picture for compensatory thinking and planning. Research is needed that manages to assess the entire proposed process of compensatory thinking in the face of temptation (temptation leading to the activation of compensatory beliefs, compensatory beliefs leading to indulgence, and indulgence being followed through or not upon by compensatory behaviors) in one research design. So far, empirical support has been found for these phases in individual studies: the activation of compensatory intentions (Kronick & Knäuper, 2010), the link between compensatory thinking and caloric intake (this study), for the link between activation of compensatory beliefs and specifically "indulgence" (Miquelon et al., 2008; Rabiau & Knäuper, 2008) and the link between compensatory thinking and a failure to follow-through through with compensatory plans (Rabiau, Knäuper, Nguyen, Sufrategui, & Polychronakos, 2009; Miquelon, Knäuper, & Vallerand, unpublished manuscript). While investigating all such links in one study design would be ideal, it would likely be

highly challenging because of self-presentation issues. For example, it is difficult to indulge in a laboratory situation in general, and particularly so right after having reported compensatory beliefs and intentions. A creative experimental design is thus needed that allows experimenters to unobtrusively observe the correlation between compensatory beliefs/intentions and their corresponding indulgent behaviour (i.e. food choice or intake).

Footnote

[1] Two scales were chosen to assess restraint, the RS and the TFEQ-R. These two scales were chosen because they assess two very different natures of restraint (for a review, see Kronick & Knäuper, 2007). Briefly, the RS has been shown to predict unsuccessful dieting while the TFEQ-R has been shown to predict successful dieting (when participants used food diaries to report their food intake). When assessing whether CIs and CBs predict caloric intake, we deemed it necessary to include both restraint scales in the regression analysis because they measure two different aspects of dieting, both of which have been demonstrated to be associated with caloric intake.

GENERAL DISCUSSION

The research presented in this dissertation supports two main findings. One, that when tempted, dieters form compensatory intentions (CIs) and that the use of CIs serves to relieve the conflict of temptation. Two, that the formation of CIs predicts dieters' caloric intake to the extent that an increase in compensatory thinking predicts an increase in diet-breaking food consumption. Together, these findings suggest that compensatory thinking is detrimental to diet adherence, in that the use of thoughts that support compensatory planning ("I'll eat this cookie, then I will skip dinner") encourage dieters to break their diets.

While previous research has addressed compensatory thinking as a proposed cognitive strategy used in health contexts (Miquelon, Knäuper, & Vallerand, unpublished manuscript; Rabiau et al., 2006), this is the first study to identify compensatory thinking in an experimental setting for the purpose of instantiating the existence of such thinking in dieters and assessing whether such thinking influences dietary behaviour. With these findings, it may be proposed that compensatory thinking—a previously *assumed*, but not empirically demonstrated cognitive process in dieters—plays a significant role in dieting and, in particular, in the cognitions that relate to temptation. CBs and CIs may therefore be said to be part of a dieter's cognitive profile and, as such, to contribute to the management of food intake.

The question of whether dieters form CIs and whether such intentions impact dieting behaviour is important, as any cognitive process that is shown to translate into diet-breaking behaviour must be identified and investigated in the

name of weight loss management. Of course, when dieters form CIs to "indulge and then make up for their indulgence", they assume that they will follow through with the compensatory behaviour that they have planned. They do not expect that their act of indulgence will sabotage their diets as they have only allowed themselves the "right to indulge" on the grounds that the impact of indulgence will be obliterated with a compensatory behaviour. In other words, they do not set out to break their diets with their act of indulgence, but merely account for their "misstep" at a later point. For this reason, when addressing the issue of CBs and CIs in dieters, it is not enough to simply look at the intention to indulge and the indulgence itself, but to look at whether dieters *actually* compensate for having broken their diets. This is because an increase in caloric intake on the part of dieters who form CIs (to compensate for indulgence) is *only* problematic if the increase is *not* compensated for (with a later increase in restrained eating or exercise). That is, dieters who form CIs to indulge and, as a result, engage in the act of behavioural indulgence, are only at risk of sabotaging their weight loss plan if they do not follow through with their CIs. We are thus left with the question: Do dieters who form CIs have a tendency to follow through with their plan to compensate? If not, what are the reasons they may fail to do so? And, if they do manage to implement their intention to compensate, what tools and mechanisms might they apply to find this success?

Compensatory intentions: A failure to implement

Compensatory intentions (CIs) are only detrimental to dieting if they are not implemented. Findings suggest that more often than not, individuals who

endorse compensatory beliefs (CBs) and have formed CIs are unsuccessful and that, when it comes time to compensate for indulgences, the majority of dieters who have formed CIs fail to follow through with their plan to compensate (Miquelon, Knäuper, & Vallerand, unpublished manuscript; Rabiau, Knäuper, Nguyen, Sufrategui, & Polychronakos, 2009).

There appear to be several reasons why such compensation is never accounted for. The first reason may be attributed to poor planning. Indeed, research suggests that without a specific plan for meeting a goal (to, for example, eat only salad for dinner) comprised of detailed initiatives (to buy vegetables on the way home from work, etc.), the chance of meeting a goal is significantly lower than if a detailed plan for compensation is constructed at the outset. In particular, the study of implementation intentions has brought forward the theory that it is, in particular, the formation of an intention that has "if-then" components that optimizes the likelihood of plan execution. What is needed is an "if-then" plan that links situational cues (opportunities to act and situational moments) with responses that are effective in attaining goals or desired outcomes (Gollwitzer, 1993, 1996). The idea is that detailed, cue-triggered specificity helps overcome the difficulties of self-regulation problems that may otherwise impede intention implementation. Thus, according to this reasoning, dieters who form the intention to compensate for an indulgence are most likely to follow through with their plans to compensate if their plans have, from the outset, an "if-then" structure allowing for cue-response activation. If a plan with a structure such as "if I see vegetables on the way home from work, then I will buy them for dinner for the purpose of

compensating for my earlier indulgence" is set up, the likelihood that the plan is implemented is increased. As a corollary, it seems that the plan might also take a "when-then" structure, that may further remove the chance that implementation will fall through (i.e. "*when* I see vegetables on the way home from work, then I will buy them for dinner for the purpose of compensating for my earlier indulgence"). A "when-then" plan structure has the embedded implication that said plan *will* be implemented, and that the action taking place is not predicated on the *possibility* of the cued situation to emerge, but rather the *assurance* of it occurring.

Of course, at the time when the CI is formed, the emotional desire that drives temptation has a powerful, distracting effect on dieters to the extent that the goal of indulgence arguably takes priority over the goal of compensation, thereby decreasing the chance that dieters will be able to create well formed intentions for compensation. In other words, when dieters desire something that yields physiological pleasure, they may not (without conscious exertion) have the attentiveness necessary to formulate detailed and specific resolves to compensate for giving into their desire. Indeed, it has been shown that spontaneous attention to enticing stimuli can undermine goals (Mischel & Ebbson, 1970; Mischel & Patterson, 1978). In the case of dieters who are forming compensatory intentions to allow for indulgence, the goals that are being undermined are not the diets per se, but the plans to compensate for indulgences. Because dieters are distracted by the temptation, the likelihood for the compensatory plan to be sufficiently elaborate to optimize the opportunity to follow through is low. The primary goal

is to indulge and, therefore, it stands to reason that CIs are formed in haste as loose, undefined resolves implemented more as means to permit immediate indulgence than to ensure effective follow-through.

This presupposition (that compensatory plans are poorly formed at the outset) is further supported by our finding (Kronick & Knäuper, 2010) that CIs are formed as a means of relieving the uncomfortable conflict of, at once, wanting to indulge and wanting to maintain initial weight loss goals. This suggests that CIs are formed under emotional, anxiety-laden circumstances, and driven by the need to reduce this uncomfortable feeling. Research indicates that decisions that are made under intensely emotional circumstances are, in general, less reasoned and less formulated than those resolves formed under calm conditions. In particular, research on decision making has found that individuals who experience intense emotions feel "out of control" to the extent that they are unable to form sound decisions (Baumeister, Heatherton, & Tice, 1994) and that anxiety can have a highly debilitating effect on sound cognitive application (Barlow, 1988). Thus, the chance for dieters to form well reasoned, elaborate plans appears to be reduced by the emotional state experienced at the moment of temptation, rendering the plan to compensate vague and perfunctory, to the point of ineffectiveness. Of course, at the time of plan formation, dieters do believe that they will execute their plan to compensate—no matter how vague—precisely *so that* they may engage in indulgent eating behaviour. Indeed, the plan is rarely a 'plan' per se, and more of a self-fooling mechanism, wherein dieters delude themselves into believing that they are in control, acting rationally and

formulating an true plot for compensation. In actuality, they likely are not really *planning* for anything other than indulgence, as their emotional, conflicted state of wanting to indulge and wanting to lose weight makes it very difficult for them to plan reasonably.

Thus, this suggests that the chance of forming a well developed plan to compensate (and meet goals) is compromised in two ways: first, by the physiologically driven force of desire (temptation) that forces primary attentiveness on indulgence rather than compensation and second, by the anxious state in which dieters come up with a solution to relieve the conflict of temptation as quickly as possible, without regard for its actual feasibility. It thus appears that desire and the stressful anticipation of failing to meet weight loss goals are at least two reasons why dieters are unable to form proper intention to compensate with the detail and specificity required for success.

However, hasty plan formation is not the only problem that hinders the implementation of CIs. Even with a well designed plan to follow through, when it comes time to enact the plan, several things may interfere with success. Once again, it may be argued that unlike other goal implementations, one that involves deprivation is particular challenging. In the case of a compensatory plan, dieters who plan to, for instance, eat salad for dinner, may be well prepared to do so, but because this plan to eat salad must incorporate a caloric deficit beyond the pre-existing deficit already prescribed by the diet, it may prove to be too great a sacrifice to sustain. Again, the physiological aspect of the plan—i.e. to further deprive—poses an additional imposition on dieters, who, at the time of said

compensation, may be already weakened by hunger and/or desire. Compensating for the indulgence is therefore particularly difficult and not the simple trade-off of "indulging now, and restraining later" that might have been initially conceptualized by dieters. Dieters must realize that there is always a price to pay for indulgence, and this price is above and beyond the already existing cost of dieting. With the formation of CIs and the act of indulgence that follows, dieters already committed to restricted regiments are asking themselves to further restrict their intake and this imposition, may simply be too taxing. Thus, the increased burden of restraint necessary to follow through may itself be a reason that dieters who form CIs fail to enact their plans of compensation.

Another reason may be simple forgetfulness. Again, this may be attributed to the fact that the plans to follow through are ill-formed in the first place, failing to leave a lasting impression on dieters. But even with a detailed plan, it is possible that hunger cues could dominate dieters' drives and overwhelm plans to compensate. Indeed, it has been shown that forgetfulness of goal intentions occurs quickly in "demanding situations", particularly when multiple factors provide engrossing and distractible fodder (Einstein, McDaniel, Williford, Pagan & Dismukes, 2003). This may be particularly true if dieters are met, once again, with a tempting scenario that needs to be managed. Will the tempting food item be too alluring to ignore, to the extent that all plans to not just avoid typical temptation, but further cut-back, are forgotten? Will the same forces of hedonism that forced a hasty compensatory plan to be formed in the first place dominate over the desire to lose weight? Whether or not this occurs certainly depends on a

combination of the factors here discussed.

Yet another reason why dieters may fail to follow-through with their plans to compensate may not be for lack of attempt, but rather for lack of information. Indeed, it is possible that dieters do not manage to limit their food intake to the extent that they restrict their food intake sufficiently to cover the "damage" incurred by indulgence. This could be due to an overestimation of restraint where dieters eat less than they *want*, but not enough to sufficiently compensate for the indulgence. Indeed, it has been theorized that even out of the confines of a compensatory strategy, restrained eaters may have difficulty losing weight because they eat less than they want—and feel deprived— but not a low enough amount to lose weight (Lowe & Levine, 2005). However, it may also be the case that dieters who attempt to compensate for their indulgence simply lack adequate caloric knowledge wherein they do not know, for example, how many calories indulgent items have and thus do not know how much less they must eat at the next meal. Either way, it is clear that if dieters indulge and balance out their caloric intake with a caloric deficit that does not fully account for the extra food intake (i.e. that goes above and beyond the already prescribed diet restriction), the compensatory plan has not succeeded in balancing out the indulgence. In the end, it is essentially a matter of caloric counting, wherein dieters who are already looking to incur a caloric deficit must incur a further deficit to account for the increase they took in when they chose to indulge. When dieters engage in indulgent eating behaviour with the intention to compensate, it is essential that they are well versed in caloric counts so that they may balance out their caloric

equation effectively, whether it be with further restraint or exercise.

Another problem with the formation of compensatory intentions is that dieters are not anticipating precisely how much work will be involved in the act of compensation. That is, there may not be the clear expectation that compensating for indulgence will be difficult and will involve an additional exertion should weight loss goals not be forfeit. Indeed, research has shown that individuals' perceived difficulty (or ease) of performing a particular behaviour directly impacts their ability to follow-through on behavioural intentions (Ajzen, 1991). Overall, the message of forming CIs while dieting is, then, that they do not come without consequence. Essentially, dieters must be aware that when forming a CI they are not simply delaying restraint for later, but demanding increased restraint or effortful / exhausting compensation through exercise later. Indulgence never comes without a price and although the satisfaction of indulging "now" may appear to be worth the work of compensating "later", it just may not appear to be once that "later" point in time presents itself.

One reason why this may be the case relates back to the immediate emotional state of dieters when forming the CI. Dieters are at once anxious to relieve the conflict presented by wanting to indulge and wanting to maintain weight loss goals. The formation of compensatory plans is not only created under anxious and distracted circumstances, but also under circumstances of desire. Dieters are motivated to find a solution to the dilemma and this motivation is emotionally charged. Dieters do intend to compensate, but their poorly elaborated plans are set to take place at a time when their emotional states are undetermined.

They may not realize that at a later point in time, new, emotionally neutral states may be present that will not respond well to the demands set by the initial, emotionally-laden commitment. Loewenstein, Prelec and Shatto (1996) have explored the notion of "hot/cold" states and have found that people who are experiencing cold states (lack of hunger, temptation, sexual arousal) have difficulty imagining *not* being in the same state at a later point in time. This same "hot/cold empathy gap" applies to individuals who experience "hot states" such as temptation and desire wherein they "underappreciate" what it will feel like to be in a "cold state" later on. When dieters who are overcome by temptation (in a hot state) form compensatory intentions to exert themselves as a means of balancing out the effects of their indulgence, the hot state that they experience prevents them from imagining a potential cold state later on, when the enactment of the plan is to take place. Because it is a demanding plan, dieters need to be highly motivated and emotionally charged (in a hot state) in order to execute it. However, it is uncertain, and potentially unlikely, that such a hot state will be present at the time to follow through and conducive to compensatory behaviour.

It thus appears that because, for the described reasons, dieters have difficulty following through with their plans to compensate for the extra calories that they have consumed and that, therefore, their increase in caloric intake is not cancelled out, the formation of their CIs may be detrimental to the success of their diets. That is, if the initial caloric indulgence does not have the impermanent status that was intended for it but instead, by virtue of a lack of compensation for an increase in calories, takes on a permanent status, the initial formation of the CI

may be said to be a detriment to dieting success. Indeed, over time this accumulated lack of compensation may lead to weight *gain*, rather than weight loss. As such, it may be said that compensatory thinking serves as one explanation for why dieters often fail to meet their weight loss goals and, that therefore, the majority of dieters should be advised not to use it.

Diet plans that endorse the use of compensatory planning

However, despite evidence that suggests that the formation CIs are detrimental to ultimate dieting goals, many weight loss systems and diet theories incorporate compensatory-type thinking into their programs with the conviction that using such thinking is both a strong model and effective motivational tool for dieting. In particular, systems like Weight Watchers® have developed a "POINTS® Food System" that allows dieters to accumulate a specifically prescribed number of points per day. Points are numerical amounts that correspond to the caloric, fat and fibre content of foods. Foods with a low number of calories, a low amount of fat and a high amount of fibre have only a few points ascribed to them, whereas foods with a high number of calories, a high amount of fat and a low amount of fibre have a greater number of points ascribed to them. In addition to their prescribed number of calories, dieters receive a certain number of "Flex Points" – additional points that can, ideally, be added to dieters' daily POINTS in moderation (thus topping up the restricted calorie plan) or be used up in one "splurge". Dieters are invited to use the "Flex Points" in "splurge contexts" in order to make eating out not only possible, but enjoyable. The "Flex Points" are limited, however, so once dieters use up their "Flex Points" they must return to

their restrictive diet. Thus dieters who are tempted may have the CI "to use up my "Flex Points" on this cake, and then eat "without additional points all week". Because the diet must accommodate the additional caloric expenditure imposed by the "Flex Points", without these points, caloric intake is low and restraint is quite vigorous. This system implicitly incorporates a compensatory belief system that precludes that dieters will *be able* to return to their base number of points following the use of all their increased number of points. One factor that would appear to increase the likelihood of this occurring is Weight Watchers®' embedded structure that prescribes if-then reasoning. Therefore, in a specified manner, dieters may reason "if I use up "Flex Points" today, then I will not use any tomorrow". However, even with such designated implementation intention forming, distracters and emotional cues may still serve to interfere with plan execution. Indeed, it has been shown that, as is the case with other popular diets (such as Zone and Atkins), diet adherence rates for individuals on Weight Watchers® are low (Dansinger, Gleason, Griffith, Selker & Schaefer, 2005).

Nevertheless, other diet plans continue to endorse the use of compensatory intentions. One popular plan, the "Every Other Day Diet" (EODD; Benson, 2002-2008), capitalizes on CIs as a means of not only balancing out eating, but boosting metabolic functioning. According to reasoning behind the diet plan, a period of overeating followed by a period of deprivation balances out caloric intake, prevents an overall deprivation of indulgent foods and serves to fool the metabolism into engaging a state of high-burn functioning. The diet recommends eating large amounts of high caloric foods and then compensating for it, by

strictly limiting food intake. Thus dieters are asked to follow a routine in which they indulge one day and deprive themselves the next day. The diet is titled the "Every Other Day Diet" because dieting only occurs every other day. This eating regiment is supported by the notion that one has difficulty losing weight because when eating a low number of calories, the body "believes" that food is scarce and, acting according to instinctive drives of survival, automatically goes into "starvation mode", slowing down to accommodate the deprivation. When individuals consume large amounts of calorically dense foods, the opposite effect occurs. The metabolism speeds up as it "believes" that food is abundant and that the body does not require it be stored. The key to successful dieting, according to the EODD plan, is to fool the body into "believing" that food is abundant and that there is no need to store calories while not actually incurring an increased amount of calories. The way to do this is to indulge and speed up the metabolism and then abruptly starve, so as to stop incurring calories while the metabolism is still rearing high. In principle, this diet may have physiological merit, but from a psychological perspective, enforcing deprivation every other day, despite prior indulgence, may not be as easy as it sounds. Again, plans to compensate for indulgence are marred by a host of factors that seem difficult to override.

Also in support of compensatory intention diet processes, is the concept of flexible restraint (Westenhoefer, 1991). Flexible restraint is an attitude towards restricted caloric intake that incorporates a less rigid approach to dieting involving the occasional indulgence. It has been theorized that such a dieting approach is successful because it provides a way of perceiving dieting as a process that does

not limit the pleasures of eating, but merely reduces the frequency of indulgence. Thus a flexible diet is one that allows for the consumption of high calorie foods in moderation and accepts that such allowances are a necessary component in restraining, as without such an approach, dieters are so deprived they invariably end up indulging in ways that are not moderate, i.e. disinhibiting. Included in the notion of flexible restraint is not simply the endorsement of moderate indulgence, but the use of compensatory behaviours to compensate for the (even moderate) increase in calories. The Flexible Restraint Scale (which appropriates some items from the Three Factor Eating Scale) includes the following compensatory items: "While on a diet, if I eat food that is not allowed, I consciously eat less for a period of time to make up for it", "If I eat a little bit more one day, I make up for it the next day", "If I eat a little more during one meal, I make up for it at the next meal". Such items emphasize the endorsement of compensatory beliefs in dieters and assumes an endorsement of such type of reasoning. Other items, however, endorse less of a less rigid approach to dieting that, all the while, applies significant amounts of conscious restraint. For example, items such as "Usually I prefer light foods that are not fattening" and "Although I pay a lot of attention to my figure, I enjoy a variety of food" suggest some flexibility in dieting. Items such as "When I have eaten my quota of calories, I am usually good about not eating any more" and " I deliberately take small helpings as a means of controlling my weight" and "I consciously hold back at meals in order not to gain weight" suggest restrictive eating behaviours. While Westenhoefer, Stunkard and Pudel (1999) showed flexible control to be associated with lower disinhibition,

lower BMI, less frequent and less severe binge eating episodes, lower self-reported energy intake, and a higher probability of successful weight reduction over one year, it is unclear if endorsement of the compensatory items (3 items /12 items) were predictive of the changes in weight. However, given the evidence suggesting a lack of follow-through by those who form compensatory intentions, it is likely that the "flexible" dieters' success is more due to the motivational impact of knowing that their diet is flexible –i.e. not limited to diet foods—than their ability to indulge and then compensate. What is interesting is the assumption that compensatory planning contributes to such success when evidence suggests it most likely does not.

A more explicit endorsement of compensatory intentions can be found in a weight control initiative in the Netherlands. "Balance Intervention", a program sponsored by the Netherlands Nutrition Centre, aims to promote quick 'caloric compensation' in response to occasions of overeating, which, they accept, are likely occur (Wammes, Breedveld, Kremers, & Brug, 2006). The program is designed to raise awareness of the likelihood of overeating and, in light of this, to recommend developing compensatory strategies to accommodate indulgence. A study on the introduction of 'balance intervention' (Wammers et al., 2006) to the general population (where participants had an average BMI of 24, and thus classified as falling just below 'overweight') found that while the endorsement of compensatory strategies (via print and radio advertisement) was associated with more positive attitudes about compensation and intentions to compensate, the majority of respondents reported using the compensatory behaviours less than

once a week. These findings, along with said research indicating a lack of follow-through on the part of individuals who form compensatory intentions, have raised concerns about the implementation of the program and instigated a push for further research into adoption of compensatory strategies in the Netherlands. One step that has been taken involves the Compensatory Health Beliefs Scale (Knäuper et al., 2004) – a scale developed to test the prevalence of compensatory beliefs—which has been adapted by Dutch researchers (deNooijer. Puijk-Hekman & van Assema, 2009) in order to assess compensatory thinking in the Dutch dieters.

Increasing the likelihood of implementing compensatory intentions

If the use of compensatory thinking is to be successful, several specific cognitive tools need to be applied. As we have seen, studies have shown that if goals are to be implemented, the plans to implement them need to be specific, and set in a context-sensitive structure (i.e. if-then). Thus, dieters who form the CI "to eat this cookie now and cut back later", have the highest chance of following through on their plans to cut back if they specify the details of their "cutting-back" plans. Such details need to be consciously elaborated so that when the time comes to cut back, the potential of not cutting back (increased by hunger, anxiety, distraction, forgetfulness, lack of information, etc) are decreased.

However, once an elaborate, specific and feasible plan to compensate for indulgence is formed, the question remains of how to make sure that the plan is set into motion. Certainly, one's self-efficacy is integral to the success of meeting

health goals. Self-efficacy has been defined as the belief that one is capable of performing a certain way to attain certain goals (Bandura, 1977). Research has shown that health behaviours such as dieting are dependent on one's level of perceived self-efficacy (Conner & Norman, 2005). The reasoning appears to be that self-efficacy influences the effort put into changing risk behaviour and the persistence to strive despite barriers that may undermine motivation (temptation). Thus, it appears that one factor that determines whether dieters who have formed a CI to follow through on their plan to compensate will, indeed, compensate, is if they believe that they will have the willpower to engage in the increased restraint of compensation that their plan demands.

Provided that self-efficacy is high, and the implementation plan is specific and feasible, dieters then have the task of finally performing the compensatory behaviour—that is, they must, at 5pm, buy vegetables, eat a salad and stop eating following the consumption of the salad, even if they are still very hungry. One final obstacle that may present itself when trying to execute the plan to compensate is that of a negative mood state. Studies have shown that people succumb to the influence of negative moods, and allow mood to overwhelm the meeting of prior goals, with the idea that improving the negative mood is a priority, even if the believed way of improving the mood involves a direct obstruction of the initial goal –i.e. with consumption of indulgent food only assumed to offer solace (Tice, Bratslavsky, & Baumeister, 2001).

In order to use reason to overwhelm the influence of negative moods, cognitive behavioural therapy (CBT; Beck, 1964) may be applied. One of the basic tenets of CBT states that whenever individuals experience a mood, it is driven by a thought that helps define it (Greenberger & Pedesky, 1995). In addition to affecting mood, individuals' thoughts also directly impact their behaviours and their physical reactions. Recognizing the "automatic thoughts" that occur in individuals' minds in various situations is the first step of CBT. For example, dieters should learn to identify what they were thinking when, while being offered a slice of birthday cake at a party, they felt nervous. Identifying the thought or thoughts that drive their feelings of nervousness is the key to effective CBT, because once the thoughts are identified, they may be challenged and re-evaluated to differentially impact mood. Such a process is a multi-levelled procedure that can be learned over several weeks and, once individuals habituate to the practice, has the potential to predominantly guide future appraisals. The following is an example of how a dieter who has formed a CI may practice CBT to impede a lack of follow-through. It is 5pm, time to, as intended, buy vegetables and eat salad for dinner. The feeling experienced is that of frustration. Or, more explicitly, "I do not feeling like eating salad". This feeling however, is invariably associated with one or more thoughts. Such thoughts might include "[eating salad for dinner] is going to be hard". Such a thought presumably triggers the feeling of frustration or "not feeling like eating salad". The key is to challenge the validity of the thought "this is going to be hard" by presenting two sides of an argument for and against the statement with the use of *evidence of how true it is*. First, are

arguments that provide supportive evidence: “salad looks so unsatisfying” and “last time I ate only salad I wanted more”. Then there are the arguments that provide non-supportive evidence: “when I eat salad for lunch I am satisfied”, “the fibre is filling”. In the end, one is meant to arrive at a balanced statement about the truth of the statement “[eating salad for dinner] is going to be hard” that should present as follows: yes, “salad appears unsatisfying” and yes, “last time I ate salad I wanted more”, but “when I eat it for lunch I am satisfied” and “fibre is filling” *and therefore, I should stick to my plan to eat salad as compensation for my indulgence.* After such a balanced thought is executed, dieters could then ask themselves how they feel, and most likely, it will no longer be “frustrated”, but rather “motivated”.

Other, more elaborate replacement thoughts can be used to challenge sabotaging automatic thoughts and increase the likelihood that emotions will not override implementation plans. One idea would be to teach dieters to challenge their emotion-laden automatic thoughts about the difficulty of compensating with the idea that they are dieting backwards, as it were, and that the indulgence they engaged in was actually a pre-reward for the extra hard work that is yet to be done. This is would serve to challenge the thoughts that “eating salad is unsatisfying” with the evidence that *eating salad is not unsatisfying after one has indulged.* Overall, the key for the success of CBT is to recognize the power of re-evaluating cognitions as a means of overruling emotions and the negative thoughts that automatically precede them. Individuals have the capacity to change the way they think about situations, which ultimately can change the way they

feel about situations. Accordingly, dieters can change the way they regard the act of compensating to increase the likelihood that the act of compensation is implemented, as intended.

Figure 1. Managing the conflict of temptation.

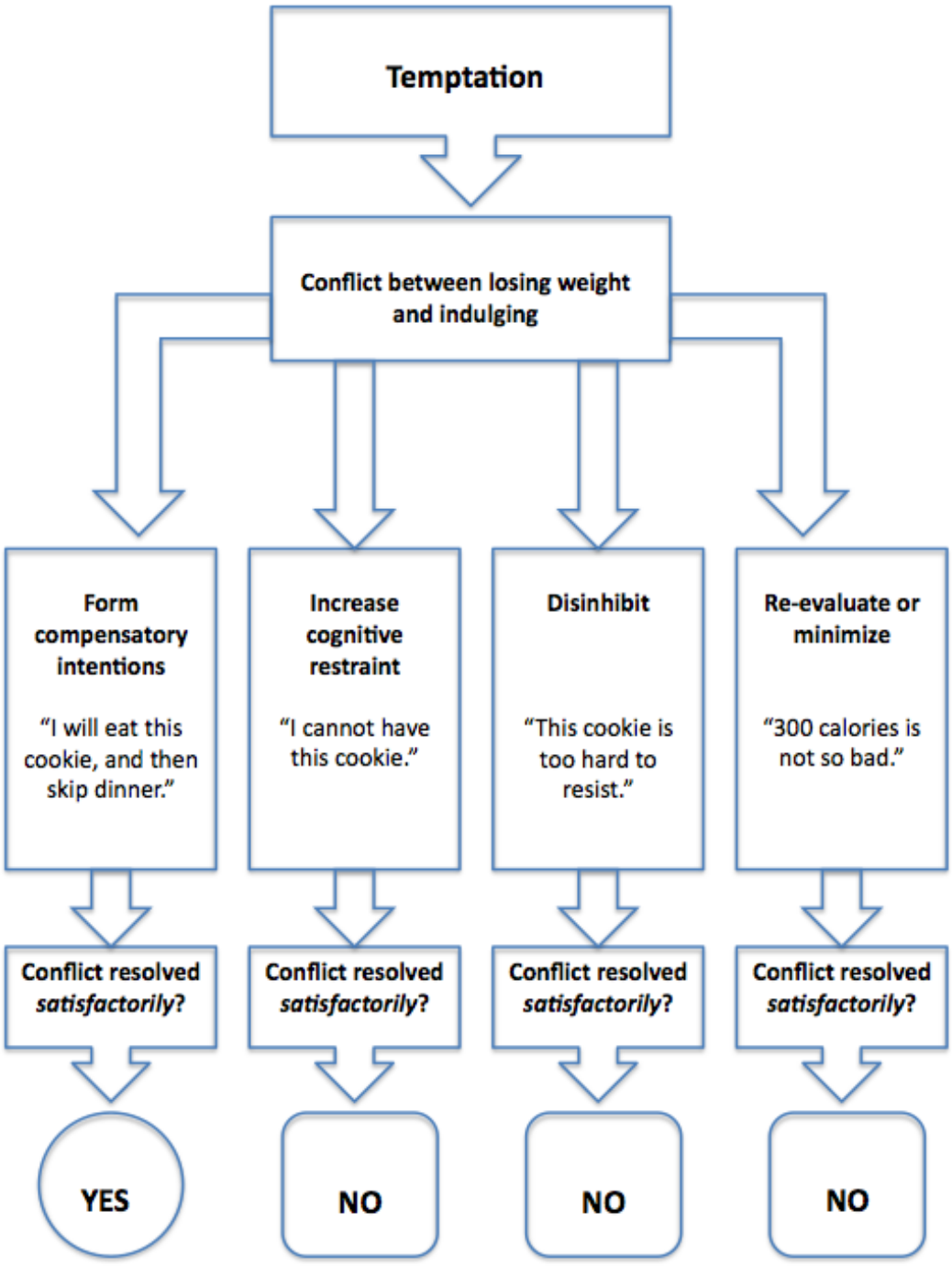
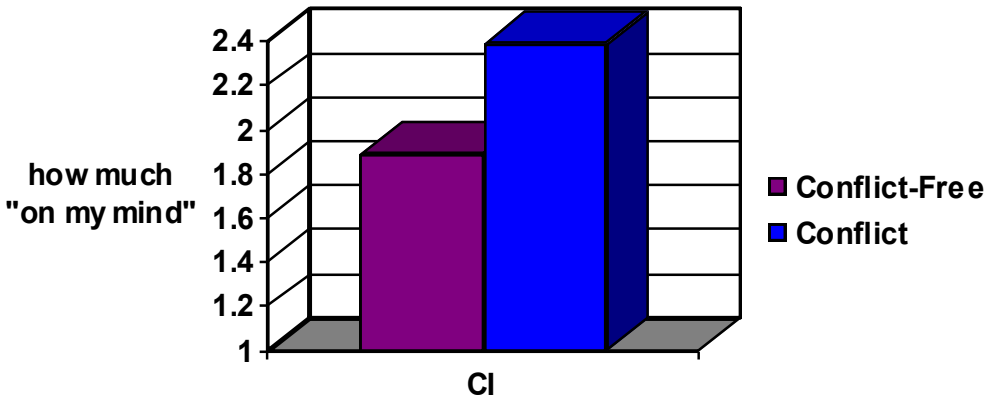


Figure 2. Comparing CI endorsement between conflict and conflict-free conditions.



Note. CI refers to Compensatory Intentions; How much "on my mind" was rated as 1 (a little bit) to 4 (very much).

Table 1. RS, TFEQ-R, TFEQ-D, CI, and CB Predicting Number of Portions Eaten: Estimate of Fixed Effects Component. From Kronick et al.(2010). Manuscript under review at Appetite.

Predictor	Parameter Estimate (*b*)	Standard Error	*t*-Value	Degrees of Freedom (df)
RS	0.20	0.26	0.77	62
TFEQ-R	-0.35	0.25	-1.41	62
TFEQ-D	0.84	0.24	3.55***	62
CI	0.57	0.23	2.44*	62
CB	0.21	0.08	2.69**	1084

Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Table 2: Intraclass correlation coefficients for Level 1 variables across assessments

	Intraclass Correlation Coefficient	F-value	95% Confidence Interval	
			Lower Bound	Upper Bound
CI	.36	13.18	.24	.53
Caloric Intake Variable	.06	2.43	.02	.15

Table 3: Bivariate Pearson correlations for Level 2 variables

Variable	1.	2.	3.	4.
1.TFEQ-D	--			
2. RS	.23	--		
3. TFEQ-R	-.01	.40**	--	
4. CB	.18	-.20	-.13	--
Mean	8.39	18.12	10.97	1.19
Standard Deviation	3.30	4.22	4.19	0.53

Note. * $p < 05$; ** $p < .01$.

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APPENDIX A: FOOD PALATABILITY QUESTIONNAIRE

KEY: Items 6, 7, 11, 14, 16, 17 represent Compensatory Intentions. The rest of the items represent filler items.

Food Palatability Questionnaire

Below is a list of thoughts one could have while deciding which cookie to eat. Please rate for each thought to which extent the thought is RIGHT NOW on your mind*, while you are contemplating which cookie to eat*. Please do NOT eat either cookie until you have completed the questionnaire and alerted the researcher. Thank you!

In the blank spaces, please write which cookie the thought refers to, *either* cookie **A** or **B**.

	A little bit on my mind			**Very much on my mind**
1. "I want cookie ___ a lot"	**1**	**2**	**3**	**4**
2. "Cookie ___ doesn't appeal to me"	**1**	**2**	**3**	**4**
3. "I would feel guilty eating cookie ___ but it looks delicious"	**1**	**2**	**3**	**4**
4. "Cookie ___ looks chewy"	**1**	**2**	**3**	**4**
5. "I'll eat cookie ___; but I'll burn it off later to make up for it"	**1**	**2**	**3**	**4**
6. "I'll eat cookie ___ but then no more cheating on my diet!"	**1**	**2**	**3**	**4**
7. "I'll eat cookie ___ but eat less at my next meal"	**1**	**2**	**3**	**4**
8. "Cookie ___ looks crunchy"	**1**	**2**	**3**	**4**
9. "I'll eat cookie ___ and then exercise later"	**1**	**2**	**3**	**4**
10. "Cookie ___ looks bland"	**1**	**2**	**3**	**4**
11. "I'll eat cookie ___; it'll be my next meal"	**1**	**2**	**3**	**4**

12. “Cookie ___ smells so good!”	**1**	**2**	**3**	**4**
13. “I want cookie ___, but I really should not have it”	**1**	**2**	**3**	**4**
14. “I’ll eat cookie ___ but I’ll have only salad for my next meal”	**1**	**2**	**3**	**4**
15. “I’ll eat cookie ___, I bet it’s yummy!”	**1**	**2**	**3**	**4**
16. “I’ll eat cookie ___ but I then eat less tomorrow to make up for it”	**1**	**2**	**3**	**4**
17. “I’ll eat cookie ___ but I will cut back later”	**1**	**2**	**3**	**4**

For each of the following thoughts, please rate to which extent the thought is RIGHT NOW on your mind, while you are contemplating which cookie to eat. You do not have to indicate cookie A or B for these thoughts because the thoughts can refer to both.

18. “I don’t know which cookie to eat!”	**1**	**2**	**3**	**4**
19. “I don’t like cookies”	**1**	**2**	**3**	**4**
20. “It’s not the right time of day to eat a cookie”	**1**	**2**	**3**	**4**

Thank you! Please alert the researcher that you are finished with the questionnaire and wait before eating the cookie.