2 The psychology of dieting and overweight

Testing a goal conflict model of the self-regulation of eating

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The last three decades have witnessed a dramatic increase in the prevalence of overweight and obesity in most countries. For example, since 1980 obesity rates have doubled in the United States (Ogden, Carroll, McDowell, Tabak & Flegal, 2006) and nearly tripled in Great Britain (Rennie & Jebb, 2005). At the same time, obesity rates have also been increasing in many developing countries, motivating the World Health Organization to speak of a global epidemic (WHO, 2000). This is a matter of grave concern, not only because individuals who are overweight or obese are the target of prejudice and discrimination (e.g., Brownell, Puhl, Schwartz, & Rudd, 2005), but also because obesity is associated with an increased risk of morbidity and mortality (McGee, 2005; Stroebe, 2008).

From homeostatic to hedonic theories of eating

The question why some people become overweight or even obese whereas others are able to keep their weight within the normal range has interested psychologists for many decades (e.g., Bruch, 1961; Herman & Polivy, 1984; Kaplan & Kaplan, 1957; Schachter, 1971). Since there is consensus that weight is homeostatically regulated, most psychological theories have answered this question by suggesting a disturbance or breakdown of homeostatic control. It is widely accepted that individuals who are overweight or obese have lost the ability to recognize the internal hunger and satiety signals that are part of homeostatic regulation and respond instead to cues that are unrelated to the physiological needs of their body. For example, externality theory (e.g., Schachter, 1971) assumes that exposure to food-relevant external stimuli (e.g., the presence of tasty food; dinnertime) triggers eating in overweight and obese individuals, while psychosomatic theory (e.g., Bruch, 1961) suggests that overweight and obese individuals are unable to distinguish hunger cues from other states of bodily arousal (e.g., strong emotions). Finally, the boundary model of eating (Herman & Polivy, 1984) argues that individuals with weight problems are often chronic dieters (i.e., restrained eaters) who regulate their food intake according to self-set

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rules of maximal calorie intake (diet boundary) and who, as a result of their chronic dieting, have lost the ability to recognize bodily hunger and satiety cues. Since the cognitive regulation of eating requires a great deal by way of cognitive resources, their eating control breaks down when they are distracted by strong emotions or when they are de-motivated as a result of having transgressed their diet boundary.

There can be no doubt that food intake and body weight are to some extent homeostatically controlled and that hormonal and neural signals are critical in the regulation of food intake (e.g., Woods, Schwartz, Baskin, & Seeley, 2000). What is increasingly questioned, however, is the importance of homeostatic regulation for the development of overweight and obesity (Lowe & Butryn, 2007; Pinel, Assanand, & Lehman, 2000; Stroebe, 2000, 2002, 2008). As Pinel and colleagues argued, people in food-rich environments rarely experience energy deficits, but they eat because of the pleasure they expect to derive from food. Along similar lines, Lowe and Butryn suggested a distinction between homeostatic hunger (resulting from a prolonged absence of food intake) and hedonic hunger (determined by the availability of palatable food in people's environment). According to Lowe and Butryn, people experience weight problems if their eating is overly influenced by hedonic rather than homeostatic hunger.

By emphasizing the importance of hedonic eating or eating enjoyment as a determinant of overweight and obesity, these theorists have advanced our understanding of eating regulation among individuals with weight problems. However, they fail to address the question why hedonic hunger or eating enjoyment comes to dominate the regulation of food intake of individuals with weight problems, and how it succeeds in derailing homeostatic regulation and undermining people's motivation to diet. To address these questions, my colleagues and I have developed (and empirically tested) a goal conflict theory of eating that is described in the following section (Papies, Stroebe, & Aarts, 2007, 2008a, 2008b, 2008c; Stroebe, 2008; Stroebe, Mensink, Aarts, Schut, & Kruglanski, 2008a; Stroebe, Papies, & Aarts, 2008b).

Why dieters fail: A theory of hedonic eating

Body weight is strongly determined by genetic factors (e.g., Maes, Neale & Eaves, 1997). It is therefore plausible to assume that most people who are overweight or obese have a genetic disposition towards weight gain (Bouchard & Rankinen, 2008; Lowe & Kral, 2006). Although this does not alter the fact that ultimately overweight is due to an imbalance of energy input and energy output (i.e., too much food and too little exercise), such a genetic disposition increases the likelihood for an imbalance to arise. Once people have gained substantial amounts of weight and become overweight or even obese, they typically go on weight loss diets in an attempt to shed some of their weight (Serdula et al., 1999). These diets can be successful in the short run and may result in considerable weight loss. However, the majority of individuals regain

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the lost weight within three to five years (Mann et al., 2007). As a result, these individuals are likely to become chronic dieters (i.e., restrained eaters). The question to be addressed in the remainder of this chapter is why chronic dieters so often fail in their attempt at weight control.

Restrained eating and the breakdown of eating control

According to the goal conflict model of eating, the difficulty of restrained eaters in resisting the attraction of palatable food is due to a conflict between the goals of eating enjoyment and of weight control (Stroebe, 2002; 2008; Stroebe et al., 2008a). Restrained eaters like the pleasure of enjoying palatable food, but at the same time they also want to control their weight (i.e., lose weight or at least not gain it). Unless one loves grilled fish or salads, these two goals are incompatible. Chronic dieters therefore try to shield their weight control goal by avoiding thinking about palatable food. Unfortunately, at least from a dieting perspective, most of us live in food-rich environments, where we are surrounded by cues signalling or symbolizing palatable food. Such cues are likely to prime the goal of eating enjoyment and increase its cognitive accessibility. Once the goal of eating enjoyment has become the focal goal, it inhibits the (incompatible) goal of eating control. This is the reason why we might go to a restaurant with the firm intention of eating only a salad but, after having studied a menu (listing many of our favourite dishes), find ourselves ordering several courses, including dessert. In terms of our conflict model, the menu primed our goal of eating enjoyment up to the point where the goal of eating control became inhibited.

We suggest that restrained eaters' problems in eating regulation might begin with the fact that they are more sensitive to the hedonic properties of food. Due to this increased hedonic sensitivity, the perception of palatable food triggers in restrained eaters a hedonic orientation towards food. As the goal of eating the attractive food remains highly accessible, restrained eaters' cognitive processes will be geared towards pursuing this goal, and, importantly, conflicting goal representations will be inhibited (Aarts, Custers, & Holland, 2007). Since eating enjoyment and eating control are incompatible goals, increasing the accessibility of eating enjoyment should inhibit access to the mental representation of the goal of eating control (Shah, Friedman, & Kruglanski, 2002; Aarts et al., 2007). We tested this hypothesis in a study in which we subliminally primed restrained and unrestrained eaters (measured with the Concern for Dieting subscale of the Restraint Scale; Heatherton, Herman, Polivy, King, & McGree, 1988) either with words reflecting attractive food or with adjectives such as "delicious" or "tasty". Both primes should trigger the goal of eating enjoyment. In a control condition, we used neutral primes (i.e., words unrelated to food). Since each word was presented for only 23 ms on a computer monitor, participants could not consciously process the word. The accessibility of eating control concepts was assessed with a lexical

decision task. With this task, participants are presented with either a word or a letter string and have to decide as fast as possible whether the target stimulus is a word. There is empirical evidence that the time taken to recognize a concept reflects the cognitive accessibility of this concept (e.g., Neely, 1991). Thus, we recognize words faster if they are at the top of our minds, compared to unfamiliar and rarely thought-about words. Consistent with predictions, priming with eating-enjoyment words (but not with neutral words) significantly increased the time it took restrained eaters to recognize the dieting words used as existing words (see Figure 2.1). Eating-enjoyment primes had no effect on reaction times of unrestrained eaters.

But why should palatable food items have greater attraction for restrained than for unrestrained eaters? Since the difference does not appear to be due to differences in attitudes towards palatable food (e.g., Roefs, Herman, MacLeod, Smulders, & Jansen, 2005), we reasoned that restrained eaters' difficulty in resisting palatable food could be due to the way in which they represent food items. The work on delay of gratification of Mischel and colleagues (Metcalfe & Mischel, 1999; Mischel & Ayduk, 2004; Mischel, Shoda & Rodriguez, 1989) suggests that individuals who focus on the "hot" or hedonic features of food items, immediately thinking how the food would taste and how delicious the eating experience would be, have greater

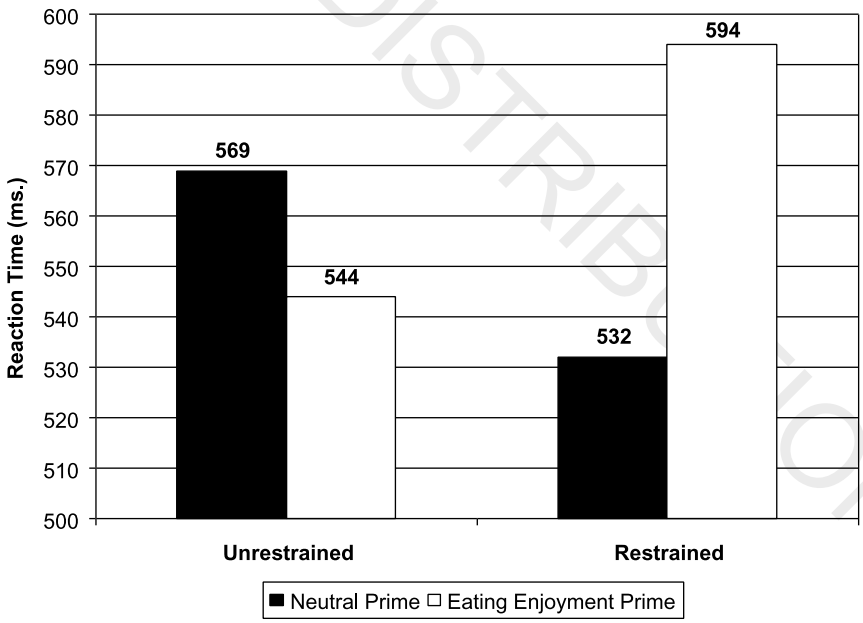

Figure 2.1 Mean reaction time to diet targets of restrained and unrestrained eaters primed with eating-enjoyment (category; object) or neutral words. [From Stroebe et al., Why dieters fail: Testing the goal conflict model of eating. *Journal of Experimental Social Psychology*, 2008, *44*, 26–36.]

difficulties in delaying consumption than do individuals who use a "cool" informational representation of the food.

Indirect support for the assumption that restrained eaters are more likely than unrestrained eaters to focus on the hedonic aspects of palatable food items come from studies of physiological and affective reactions to the perception of food. The presence or even the smell of palatable food induces more salivation in restrained than in unrestrained eaters (e.g., Brunstrom, Yates, & Witcomb, 2004; LeGeoff & Spigelman, 1987; Tepper, 1992). Furthermore, exposure to palatable food cues elicits stronger cravings in restrained eaters (Fedoroff, Polivy, & Herman, 1997). To assess the presumed difference in the cognitive representation of palatable food items more directly, we conducted a study in which we used the probe recognition task of McKoon and Ratcliff (1986), which allows one to assess the spontaneous activation of concepts during text comprehension (Papies et al., 2007). Restrained and unrestrained eaters were presented with a number of behaviour descriptions, some of which described an actor eating some palatable food. Each behaviour description was immediately followed by a probe word, and participants had to decide as quickly as possible whether the probe word was part of that sentence. With critical trials the probe word could be inferred from a sentence without actually being part of it. If reading the sentence activates the probe word, participants should take slightly longer to decide that the probe word is not part of the sentence. Thus, if restrained eaters who read the sentence "Jim eats a piece of apple cake" immediately think how delicious this cake would taste, they should take slightly longer to decide that the probe word "delicious" was not part of the sentence than would unrestrained eaters reading the same sentence. On sentences that had nothing to do with eating, restrained and unrestrained eaters should not differ in their response times. The findings of our study supported these assumptions. These findings were replicated in a second study, in which activation of concepts during text comprehension was measured with a lexical decision task.

The work of Mischel and colleagues (see, Mischel & Ayduk, 2004) points at a second process that contributes to individuals' difficulties in resisting the temptation – namely, attention allocation. Thus, the difficulty of restrained eaters in resisting the temptation of palatable food might be aggravated by the fact that once this food has triggered hedonic thoughts, restrained eaters find it difficult to withdraw their attention from the palatable food item. To test this assumption, we used the probe identification task of MacLeod, Mathews, and Tata (1986). Participants were presented with word pairs on a computer screen. The critical word pairs were food words paired with office-related (neutral) words. After a brief presentation, both words disappeared, and a probe stimulus (arrow) appeared in the location of one of the two words. Participants were asked to use two clearly marked computer keys to indicate as fast as possible whether the arrow pointed up or down. If palatable food attracts the attention of restrained eaters, these individuals should

be able to respond more quickly when the probe appeared in the position of the food word rather than the office word. Our results supported this hypothesis, and the effect was moderated by the perceived palatability of the food items. However, the effect could only be demonstrated under conditions where hedonic thoughts had been triggered beforehand with a priming task. Furthermore, it could be interrupted by subsequently (subliminally) priming restrained eaters with dieting words and thus, presumably, re-establishing the dieting goal (Papies et al., 2008a).

Thus, according to our goal conflict model, the breakdown of the eating control of restrained eaters is due to a sequential process: Exposure to palatable food triggers hedonic thoughts in restrained eaters, which result in the allocation of selective attention to these food items and the inhibition of dieting thoughts. Thus, unless they are reminded of their dieting goal, they find it very difficult to withdraw their attention from the palatable food and to resist the temptation to eat the food.

Can restrained eaters be successful in controlling their eating?

Although the moderate correlations between eating restraint and body mass index would allow for the possibility that some restrained eaters are successful in controlling their weight, such an assumption would be alien to the research tradition on restrained eating. After all, restrained eaters have been considered individuals who are characterized by their lapses rather than by their success in eating control (Heatherton et al., 1988). However, a few years ago Fishbach, Friedman, and Kruglanski (2003) suggested that with repeated and successful attempts at self-control in a given domain, an individual might form facilitative associative links between a specific temptation and the overriding goal with which it interferes. For these individuals, the activation of a temptation, even if it occurred without their awareness, might suffice to activate the higher order goal.

Fishbach and colleagues tested this hypothesis in a study in which they measured the importance of dieting and perceived success in dieting with newly constructed self-report scales. Otherwise the study was similar to that of Stroebe et al. (2008a). In support of their predictions, Fishbach et al. (2003) found an interaction between perceived success in dieting and importance of dieting for individuals who were subliminally primed with tempting food words. The more successful participants for whom dieting was important perceived themselves in their attempts at weight control, the faster they were in recognizing dieting words.

Although the Fishbach et al. (2003) study differs somewhat in design and measures from our own study, their findings suggest that our results might only hold for unsuccessful restrained eaters. In order to test this assumption, we replicated the Stroebe et al. study (2008a), but added the Fishbach et al. measure of dieting success (Papies et al., 2008b). With an interaction between eating restraint and dieting success in the conditions with palatable food

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primes, our findings were consistent with expectations: in replication of our previous results, eating-enjoyment primes inhibited the dieting goal in unsuccessful restrained eaters in the lexical decision task. However, replicating the findings of Fishbach et al. (2003), the opposite pattern emerged for successful restrained eaters: for them, eating-enjoyment primes increased the accessibility of the dieting words.

Critics of social cognition studies might wonder whether a few milliseconds difference in the recognition of dieting words should be considered proof that these self-declared successful restrained eaters are really successful in controlling their weight. To provide further empirical evidence for this assumption, we therefore correlated the success measure with the Body Mass index (BMI: an index of body weight corrected by height) of our participants. The resulting correlation was significant and negative (–.48): The higher individuals rated themselves on the Fishbach et al. (2003) measure of dieting success, the lower was their BMI (Papies et al., 2008b).

We pursued this issue further in a study in which participants were asked to indicate the strength of their intention to abstain from eating five calorific but exceedingly palatable food items during the following two weeks. When these participants (who did not expect to be contacted again) were asked two weeks later how often they had eaten any of these food items, an interesting pattern emerged. For unrestrained eaters, there was only a main effect of intention on the self-reported frequency of having eaten these food items: The more they intended not to eat them, the less they actually did. The success measure did not predict eating. However, for restrained eaters, a significant Success (Restraint interaction emerged, with intention predicting abstention from eating the forbidden food for successful but not for unsuccessful restrained eaters.

The study of successful restrained eating is obviously in its early stages, and our findings need replication. However, these findings are also rather promising. If we could find out how successful restrained eaters managed to become successful, we should be able to develop intervention strategies that would enable researchers to train unsuccessful restrained eaters to become successful.

Conclusions

With obesity rates increasing at a dramatic rate in most developed and even some developing countries, there is great need for effective programmes of prevention and intervention. Since the development of such programmes is guided or at least informed by our theories of weight regulation, validation of these theories has changed from being merely a theoretical issue to becoming of major practical importance. It is therefore unfortunate that almost all psychological theories of dieting, overweight, and obesity are based on the assumption that weight problems are due to some malfunction in homeostatic feedback. Although there has been increasing criticism of such homeostatic models (e.g., Lowe & Butryn, 2007; Lowe & Levine, 2005; Pinel et al., 2000),

eating research is still theoretically dominated by the boundary model of Herman and Polivy (1984), which assumes a malfunction in bodily feedback.

In contrast, the goal conflict model of eating attributes the difficulty of restrained eaters in regulating their food intake to a conflict between two incompatible goals – namely, between the goal of weight control and eating enjoyment and an inability to recognize bodily cues of hunger and satiation. Weight control is normally the dominant goal, and restrained eaters can go for a long time without ever thinking about eating enjoyment. However, food-rich environments are replete with stimuli that symbolize or signal palatable food, and restrained eaters are highly sensitive to such stimulation. Continued exposure to these food primes should increase the accessibility of the eating-enjoyment goal to such an extent that, at least in unsuccessful restrained eaters, it gains dominance over the goal of weight control. In contrast, in successful restrained eaters, continued exposure to palatable food stimuli, rather than inhibiting dieting thoughts, should increase the accessibility of the dieting goal.

According to Popper (1968), a new theory should replace an older one, if, in addition to accounting for all the findings that were previously explained by the older theory, it can also explain results that are inconsistent with the older theory. It would go beyond the scope of this chapter to demonstrate how our model can account for all the findings accumulated in empirical tests of the boundary model of eating (see Stroebe, 2008 for such a discussion). But, to give one example, we would argue that the preload (e.g., milkshakes; Herman & Mack, 1975) used in studies testing this theory acted as eating-enjoyment primes for restrained eaters. Thus, the subsequent overeating of ice cream by restrained eaters was motivated by a hedonic orientation induced by the tasty milkshakes, rather than by the awareness of having broken their diet rules. This assumption can not only account for all the result of preload studies (for a review, see Stroebe, 2008), it can also explain findings inconsistent with that theory: namely, that even the smell of a tasty preload induced overeating (Jansen & van den Hout, 1991). Since smelling tasty food can hardly be construed as a breach of dietary rules, these findings are inconsistent with the boundary model. Finally, this assumption can also account for the finding that exposing participants to pizza smells before a taste test of various pizzas induced overeating in restrained but not in unrestrained eaters (Fedoroff et al., 1997). We would therefore argue that the goal conflict model offers a more plausible explanation than the boundary model for the failure of restrained eaters to control their weight.

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