Master thesis

Can Implementation Intentions be Used to Create a Mental Association Between Food Temptations and a Dieting Goal?

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Abstract

Two types of dieters are known: successful and unsuccessful dieters. Successful dieters are believed to have a mental association between tempting food cues (temptations) and their long-term weight watching goal, whereas unsuccessful dieters do not. The aim of this study was to create a mental association between the personal temptation and the dieting goal by using implementation intentions. The presence of the mental association was measured by goal accessibility, which in turn was measured by the reaction time on the critical trial (consisting of the personal temptation as a prime and the dieting goal as a target) on a primed lexical decision task. The effect of the created association was expected to emerge in the behavioral manipulation in which participants were invited to take some candy. The results showed that the unsuccessful dieters who had created an implementation intention became slower on the critical trial. No significant differences were found on the remaining expectations. These results may be due to an inappropriate formulation of the implementation intention, due to a possible second pathway of creating an association, or due to unsuccessfully 'forcing' participants to form this implementation intention. An improved setup of the study will have to resolve whether the expectations can eventually be confirmed.

Key words: implementation intentions; food temptations; dieting goal; mental association

Introduction

Nowadays, being overweight is a hot topic. This is due to a rapidly rising percentage of people being overweight. On average 45.9% of the adults in The Netherlands were overweight in 2007, while in 1981 this was 33.3% (Giesbers & Frenken, 2008). Being overweight is associated with several health risks: type 2 diabetes (Ford, Williamson & Liu, 1997; Resnick, Valsania, Halter & Lin, 2000), coronary heart disease, gall bladder disease, several types of cancer, dyslipidemia, stroke, osteoarthritis, sleep apnea (National Heart, Lung, and Blood Institute, 1998) and other chronic diseases such as hyperlipidaemia, hypertension, and early atherosclerosis (Berenson, Srinivasan, Wattingney & Harsha, 1993; Berenson, Srinivasan, Bao, Newman, Tracy & Wattigney, 1998; Mahoney, Burns & Stanford, 1996). Because most of these risks are well known, many people try to watch their weight. This seems not easy in our Western 'obesogenic environment' (French, Story & Jeffery, 2001), where highly palatable but unhealthy food is almost always visible and easily available (Papies, Stroebe & Aarts, 2008).

People are confronted everywhere with these unhealthy, attractive food cues (in this study called temptations), which often result in a self-control dilemma. People want to eat this tempting food, because it tastes good and gives immediate satisfaction, but at the same time they know it would be better not to eat it, to attain their dieting or weight watching goal. A self-control dilemma is born: should the person eat this tempting food and experience immediate satisfaction, or should the person not give in to the tempting food so the dieting or weight watching goal can be reached? This self-control dilemma represents an internal conflict between the pursuit of different (short-term versus long-term) behavioral plans (Ainslie, 1992; Loewenstein, 1996; Metcalfe & Mischel, 1999; Rachlin, 1997). These kinds of dilemmas are typically believed to trigger impulsive behavior aimed at immediate satisfaction, thereby undermining the long-term weight watching goal (Muraven &

Baumeister, 2000). The hot/cool framework of Metcalfe and Mischel (1999) is in line with this idea. It predicts that temptations activate the 'hot' impulsive system, resulting in giving in to the temptation. The 'cool', rational system represents the long-term weight watching goal. This 'cool' part becomes powerless when the 'hot' part is activated. To activate the cool system, and resist temptations, self-control (*"control over the self by the self"*, Muraven & Baumeister, 2000) is needed (Kuhl & Beckmann, 1985; Gollwitzer & Moskowitz, 1996; Metcalfe & Mischel, 1999). Another theory in line with this is the goal conflict theory of eating (Stroebe, Mensink, Aarts, Schut & Kruglanski, 2008). It suggests that unsuccessful dieters have two goals: eating tasty (and palatable) food and weight control. The theory proposes that perceiving palatable food leads to the inhibition of the mental representation of the dieting goal and the goal of eating good food will dominate, which results in (over)eating the palatable food. These theories show temptations are cues which people should avoid if they want to lose weight.

On the other hand, the counteractive control theory (Trope & Fishbach, 2000) suggests temptations may automatically trigger goal-directed behavior by mentally activating the long-term goal. In other words, this theory proposes that tempting food cues actually remind people of their weight watching goal and lead to successful self-control. Fishbach, Friedman, and Kruglanski (2003) support this theory by proposing that after repeatedly exerting self-control in tempting situations, these temptations will become associated with the mental representations of the long-term weight watching goal. These representations were measured after participants were primed with temptation-related words that would potentially interfere with the weight watching goal. They found that confrontation with temptations enhanced the mental accessibility of long-term goals and facilitated goal directed behavior. Along the same side, Kroese, Evers and De Ridder (2009) tested the effect of exposure to food temptations on weight watching goal importance, goal intentions and behavior.

Participants who were exposed to these temptations reported higher goal importance and intentions than participants in the control condition. When participants had the opportunity to choose between a healthy and an unhealthy snack, the participants who were exposed to the temptations chose the healthy snack more often compared to the participants in the control condition. Although counteractive control processes are successful in some people, this is not for everyone. Not every individual has an association between food temptations and a long-term weight watching goal. In addition, being confronted with a food temptation will not lead to goal-directed behavior in every individual or in every situation. If this would be true, there would not be so many individuals experiencing so many difficulties trying to resist their temptations and lose weight. This notion, combined with the contrasting findings reported within the hot/cool framework (Metcalfe & Mischel, 1999), suggests that moderating factors might play a role in the extent to which temptations trigger the goal to diet versus the goal to enjoy food.

Indeed, one important moderator of the effect described above appears to be dieting success. Both Fishbach et al. (2003) and Papies et al. (2008) showed that after being confronted with temptations, successful dieters showed an activation of the long-term weight watching goal, whereas unsuccessful dieters did not. This suggests successful dieters have an association between their long-term weight watching goal and the temptations. When successful dieters are confronted with temptations, they are reminded of their long-term weight watching goal. This goal is then activated. When a goal is mentally activated, goal-directed behavior becomes more likely (Bargh, Gollwitzer, Lee-Chai, Barndollar & Trötschel, 2001). It seems that successful dieters have this association between their temptation and their dieting or weight watching goal, but it is still unknown if they developed this association due to not giving in to their temptation, or if they naturally own this association, which helps them to not give in to their temptation. Although the causality is

unknown, the association is known to exist in their minds. Unsuccessful dieters did not show this association (Fishbach et al., 2003). Because this association seems to be an important difference between successful and unsuccessful dieters, it would be interesting to try to let unsuccessful dieters create an association like this and see what happens. Having this association or not, seems to be what separates successful from unsuccessful dieters. Implementation intentions have been shown to be able to create new associations between situations and behaviors (Adriaanse, De Ridder & De Wit, 2009; Holland, Aarts & Langendam, 2006).

Implementation intentions are detailed plans, which include specifying when, where and how one will act in order to achieve an intended goal ("If situation X arises, then I will perform goal-directed behavior Y!"). An important feature of implementation intentions is that the situation is specified in which certain behavior will be performed. By forming an implementation intention individuals commit themselves to acting as soon as the specified situation is encountered (Gollwitzer, 1999). Looking at the underlying process, Gollwitzer (1999) and Sheeran, Milne, Webb and Gollwitzer (2005) showed that a new association between the specific situation and behavior is created when new behavior by using an implementation intention is *added* (for example: "If I am having dinner, then I will take my vitamin pills"). It is also shown that when habitual behavior is *replaced* (for example: "If I am watching television, then (I will not eat chips but instead) I will eat an apple!") by an alternative behavior in an implementation intention, the specific situation activates the alternative behavior (Adriaanse et al., 2009; Holland et al., 2006). Why this alternative behavior becomes activated is examined by Adriaanse, Gollwitzer, De Ridder, De Wit and Kroese (2009). They showed that the new association becomes equal to the old association, which means the habitual and the alternative response become competitive in winning the race of early activation. When the alternative response is repeatedly chosen in the critical

situation, the mental link between the alternative response and the critical situation is strengthened. This process shows that replacing habitual behavior by an alternative behavior is more complicated and more difficult than initiating new behavior (Holland et al., 2006).

Adriaanse et al. (2009) changed habitual behavior by replacing unhealthy snacks with healthy snacks. Participants had to create an implementation intention including the situation or the motivational state in which they normally took an unhealthy snack. Instead of taking the unhealthy snack, the participant linked a healthy snack to the situation that used to trigger the consumption of the unhealthy snack in their implementation intention ("When I am sad/angry/upset, then I will eat an apple."). After this manipulation, participants took less unhealthy and more healthy snacks.

As explained previously, implementation intentions can create new associations between situations and behaviors and thereby add new behavior or change habitual behavior (Adriaanse et al., 2009; Holland et al., 2006). The aim of this study is to create an association between a personal temptation and a dieting goal by using implementation intentions. Bargh et al. (2001) found that when a goal becomes mentally activated, the goal-directed behavior becomes more likely. This suggests that when a dieting goal becomes mentally activated and thereby more accessible, the 'right' behavior will follow. Normally *goal-directed behavior* is used in an implementation intention (Gollwitzer, 1999; Adriaanse et al. 2009). The *behavior* that will have to be performed is explicitly named, which is not the case with using a dieting *goal*; no behavior is named. This shows creating an association between a temptation and a dieting goal by using implementation intentions is slightly different than a situation-behavior association and it has not been done before.

To find out if creating an implementation intention has any effect on goal accessibility after being primed with a personal (food) temptation, this study uses two conditions: an experimental condition in which an implementation intention ('*If I see/smell my temptation,*

then I will think of my dieting goal') will be created, and a control condition in which no implementation intention will be created. Because there are differences between successful and unsuccessful dieters (Fishbach et al., 2003; Papies et al., 2008), this study will not only use two conditions, but also these two types of dieters. Goal accessibility will be measured by using the reaction time on the critical trial (which will consist of the personal temptation the participants will have to list and the dieting goal) during a lexical decision task. In case of high goal accessibility the reaction time (RT) will be shorter than in case of low goal accessibility (Fishbach et al., 2003). Two main effects and an interaction effect are expected.

The first expected main effect is a replication of Papies et al. (2008), who found that after temptation primes, the unsuccessful dieters will have a less accessible dieting goal (resulting in higher RT's at the critical trial in the LDT) than the successful dieters. The second expected main effect is that, after temptation primes, the dieting goal will be more accessible in participants who do make an implementation intention (experimental condition), as compared to participants who do not make an implementation intention (control condition). The expected interaction effect is that the effect of condition (experimental vs. control) is dependent on the successfulness of dieting (successful vs. unsuccessful), where the advantage of the experimental condition is only expected for unsuccessful dieters. This is because the successful dieters already have a natural association between their personal temptation and dieting goal, whereas the unsuccessful dieters have not. The expectation is that unsuccessful dieters in the experimental condition will have a more accessible dieting goal as compared to those in the control condition. To see whether this intervention has behavioral effects, all participants will first be primed with their personal temptation and then be invited to take some candy from four bins. The predicted pattern of results is similar to the hypotheses regarded to goal accessibility. It is expected that successful dieters take less candy

than unsuccessful dieters. Unsuccessful dieters in the experimental condition are expected to take less candy as compared to unsuccessful dieters in the control condition.

Method

Sample

Female students (N = 100) who were concerned about their weight or eating behavior, were recruited to participate in a computer task. Two participants were excluded because of being obese (BMI >30), and three because of being underweight (BMI <18). Underweight and obese people differ significantly from normal weight people regarding to their weight control behavior, and healthful eating behavior (Boutelle, Neumark-Sztainer, Story & Resnick, 2002). Others (Mela, 2006; Nasser, 2001; Vaidya & Malik, 2008) consider underweight and obese people to have a pathological relation to food which may distort the results. One participant did not follow the instructions correctly, which resulted in data that could not be used. The final sample consisted of 94 women with a BMI ranging from 18.03 to 26.03 (M = 21.86; SD = 2.01). Their mean age was 21.47 years (SD = 2.42). 54.7% of the participants studied psychology, and 45.3% was spread over different other studies.

Design and procedure

This study used a 2 condition (experimental condition vs. control condition) x 2 successfulness of dieting (successful dieters vs. unsuccessful dieters) between subjects design. The participants were randomly assigned to the experimental condition (creating an implementation intention) or the control condition (repeating an intention). All participants were told the computer task was about eating more healthily, and further instructions would be given during the computer task. The computer task consisted of four parts. First, participants had to *list a personal temptation*, after which they had to answer different

questionnaires. Subsequently, the *experimental manipulation* took place, which was followed by the *lexical decision task* (LDT). The computer task ended with again different *questionnaires.* After the computer task, the participants were asked to return to the test leader one by one. This is when and where the *behavioral manipulation* took place. After participating in the experiment, and another experiment from a colleague undergraduate student, the participants were rewarded with course credit or €12.

Questionnaires

Temptation The participants were asked to list a temptation. A temptation was defined as 'an enjoyable snack that you ought not to eat if you want to attain the goal of losing weight' (Fishbach, Friedman & Kruglanski, 2003). This personal temptation was used in the critical trial in the lexical decision task. The critical trial is unique and important in this study. The personal temptation is expected to prime the participants, which should result in different RT's on the LDT.

Self-Report Index of Habit Strength (SRHI) After the personal temptation was listed, an adapted version of the Self-Report Index of Habit Strength (Verplanken & Orbell, 2003) was assessed. The SRHI was adapted to concern the personal temptation (for example: *eating my temptation is something I do automatically)*. It consisted of 12 items, to be answered on a seven-point scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree* (Cronbach's α= 0.88).

Intention Four questions were asked to assess the intention of the participants: "I (am) determined/intend/want/expect to go on a diet the next period of time." These items had to be answered on a seven-point scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree* (Cronbach's α = 0.97). This questionnaire was be repeated at the end of the computer task (Cronbach's α = 0.97).

Subjective value, Self-regulatory success Subjective value to, and perceived self-regulatory success in weight watching (Fishbach et al., 2003) was assessed. Subjective value was assessed by asking the participants to which extent they were concerned with watching their weight and being slim (Cronbach's α = 0.34). Self-regulatory success was assessed by asking to which extent they were successful in watching their weight, in losing extra weight and whether they found it difficult to stay in shape. These items had to be answered on a seven-point scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree* (Cronbach's α = 0.65).

Attractiveness personal temptation, Forbiddenness personal temptation Next, the extent to which the participant found her personal temptation to be attractive was assessed by asking: "Eating (personal temptation) is fun/tastes good", and "When I see (personal temptation), I immediately want to eat it". These three questions had to be answered on a seven-point scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree* (Cronbach's α = 0.43). The extent to which the participant regarded her personal temptation as prohibited, which in this study is refered to as *forbidden* was assessed by asking: "How bad is (personal temptation) for you?", "How fat does (personal temptation) make you?", and "To which extent is (personal temptation) unhealthy?" These three questions had to be answered on a seven-point scale, ranging from 1 = *very bad/fat/unhealthy* to 7 = *very good/thin/healthy* (Cronbach's α = 0.81).

Filler questionnaire To conceal the true purpose of this study, and to distract the participant from all the questions about dieting and their personal temptation, a filler questionnaire was added. This questionnaire consisted of a short Big Five questionnaire of 20 items, to be answered on a seven-point scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*.

Restraint Scale (RS) After the lexical decision task, participants had to fill another questionnaire. The Restraint Scale (Polivy, Herman & Warsch, 1987) was assessed, which contained 10 items, to be answered on a four-, five-, or six-point scale, ranging from 1 = *never* to 5 = *always* or ascending weights (Cronbach's $\alpha = 0.76$).

General questions The last questionnaire of the computer task consisted of five items (age, length, weight, study, year of study).

Lexical Decision Task

All participants were instructed to perform a primed lexical decision task (LDT), in which they were asked to judge whether a string of letters is a word (Ashcraft, 2006). In this task, their reaction time (RT) was measured. The LDT started with a practice task, which consisted of eight trials. After the practice task, the real task started. This task consisted of 20 trials: One critical trial contained the personal temptation as a prime and the word 'dieting' as the critical target. This personal temptation was the same temptation the participant listed at the beginning of the computer task. Another trial contained the personal temptation and a nonword ('hilver'), and 18 neutral trials which contained as many words as nonwords. Each trial contained a fixation point (+) that remained on the screen for 1000 ms, a prime word that was presented for 50 ms, a mask (a row of Xs) that remained for 500ms and a target letter string. The target letter string remained on the screen until the participant judged the string by pressing either the 'z' (when the letter string was a word) or the 'm' (when the letter string was a nonword).

As mean reaction times on the trials of the LDT were not normally distributed, reaction times were natural-log transformed. However, to facilitate interpretation, means and standard deviations are presented for the non-natural-log transformed variables.

Experimental Manipulation

After these questionnaires, both the experimental group and the control group had to repeat the intention "This week, I will watch my weight!" in their minds, which was on the screen.

Creating an implementation intention After repeating the intention, the experimental group was shown an implementation intention (*"If I see [personal temptation], then I will think about my dieting goal"*) on their screen, which they were ordered to type over. On the next screen, their implementation intention was shown again, this time for them to repeat in their minds. After a while the screen disappeared and on the subsequent screen, they had to type their implementation intention again. After making and repeating the implementation intention, their motivation for the implementation intention was assessed by asking them to rate the statement "I'm motivated to follow my implementation intention the next period", on a seven-point scale. The control group did not have this part in their computer task.

Behavioral manipulation

To assses whether the implementation intention of the participants directly works, the 'if' part of the implementation intention (the listed personal temptation) had to be primed again. To prime the personal temptation, the participant received a short questionnaire to fill in immediately. The participants were asked to write their personal temptation down and describe it (what it looks like, what it tastes like). After this the participants were invited to take some candy from four bins if they wanted to. They were told the candy was left over from another experiment. Prior and after the participant was invited to take the candy, the candy was weighted and both weights were recorded. During the questionnaire and the candy taking, the test leader was not in the same room as the participant.

Results

Descriptives

Table 1 presents descriptive statistics for the variables under study. As expected, participants reported a relatively high attractiveness of their personal temptation. The questionnaire with which forbiddenness was measured was scored the opposite way. Participants reported a relatively high forbiddenness of their personal temptation. At the start of the experiment, the dieting intention of the participant was lower than at the end of the experiment.

Several correlations (Table 1) are noteworthy. Dieting intention is positively correlated with BMI. Dieting intention also seems to be associated with forbiddenness of the personal temptation. When the dieting intention is high, the degree to which the participant finds her temptation forbidden is also high. The extent to which a participant found her personal temptation attractive is positively associated with her habit strength.

Table 1. *Means (M), Standard Deviations (SD), and Intercorrelations for the Variables Under Study (N = 94).*

	1	2	3	4	5	6	7
1 Age	-						
2 BMI	.16	-					
3 Habit strength	.91	.18	-				
4 Attractiveness personal temptation	-.10	.10	.45**	-			
5 Prohibited nature personal temptation	.09	-0.16	.18	-.18	-		
6 First Intention Questionnaire	-.28*	.40**	.05	.10	-.30*	-	
7 Second Intention Questionnaire	-.20	.37**	.15	.18	-.36**	.82**	-
M	21.47	21.87	3.89	5.83	2.63	3.99	4.31
SD	2.422	2.01	1.06	.73	.76	1.66	1.64

* $p < 0.01$; ** $p < 0.001$

Randomization check

The participants were randomly assigned to the experimental condition or the control condition and it was checked if the groups were equal. The conditions did not differ on habit strength, the extent to which the participant found her personal temptation attractive, or forbidden, age, study, and BMI (all p's > 0.27). The conditions did differ on intention as measured prior to the manipulation F (1,94) = 4.17, p = 0.04 (experimental condition M = 3.68, SD = 1.72; control condition M = 4.30, SD = 1.56). After manipulation this difference in intention was not found F (1,94) = 0.64, p = 0.42. This means the groups could not be considered totally equal.

The participants were divided into two groups by first computing self-regulatory success, and then using a median split. The participants with the scores below the median split were defined as unsuccessful dieters, and the participants with the scores above the median split were defined as successful dieters. The group distribution can be found in Table 2.

Table 2. *Group Distribution*

		Condition		
		Control (N)	Experimental (N)	Total (N)
Successfulness	Successful dieters	27	25	52
	Unsuccessful dieter	20	22	42
	Total	47	47	94

Main analyses

Neutral trials As mentioned above, the groups were not entirely equal. To take this into account an analysis of covariance (ANCOVA) was performed with condition (experimental vs. control) and successfulness of dieting (successful vs. unsuccessful) as independent variables and intention as a covariate. The mean reaction time of the neutral trials was used as dependent variable. Because this covariate was not significant ($p = 0.30$), only the univariate analysis of variance (ANOVA) will be reported. The ANOVA was performed with condition (experimental vs. control) and successfulness of dieting (successful vs. unsuccessful) as independent variables, and the mean reaction time of the neutral trials as dependent variable.

Regarding the neutral trials, no interaction effect was found ($p = 0.14$). Next to this, no main effect was found on successfulness of dieting ($p = 0.26$). There did seem to be a

trend where the RT in the experimental condition is longer than the RT in the control condition F (1,94) = 2.76, p = 0.10.

Critical trial First, an analysis of covariance (ANCOVA) was performed with condition (experimental vs. control) and successfulness of dieting (successful vs. unsuccessful) as independent variables and intention as a covariate. The reaction time of the critical trial was used as dependent variable. Because the covariate was not significant (p > 0.05), only the univariate analysis of variance (ANOVA) will be reported.

No main effects of condition (p = 0.23) and successfulness of dieting (p = 0.83) were found. A marginally significant interaction effect was found F (1,90) = 2.69, p = 0.09. Exploring this marginally significant interaction effect, unsuccessful dieters showed to have a longer RT in the experimental condition, than in the control condition F (1,42) = 4.38, p = 0.04, while no differences were found between conditions in successful dieters. The means and standard deviations of the RT's on the critical trial can be found in table 3.

Table 3. *Means (M) and Standard Deviations (SD) of the Original Reaction Times (RT) in Milliseconds (ms) of the Critical Trial.*

			Condition		
			Control	Experimental	Total
Successfulness	Successful dieter	*M*	924.81	899.48	912.63
		SD	448.04	438.73	439.41
	Unsuccessful dieter	*M*	768.45	1036.86	909.05
		SD	314.25	482.39	428.21
	Total	*M*	858.28	963.79	911.03
		SD	400.45	459.85	432.12

Candy taking Two participants were excluded here, because of taking more than three standard deviations above the mean of candy taking, which was measured in grams (N = 92, M = 71.43, SD = 92.01).

An ANOVA was performed with condition (experimental vs. control) and successfulness of dieting (successful vs. unsuccessful) as independent variables, and the candy taking in grams as dependent variable. In table 4 the amount of candy taking is shown. No significant main (condition p = 0.19; successfulness of dieting p = 0.88) nor interaction (p = 0.86) effects were found.

Table 4. *Amount of Grams of Candy Taking*

			Condition		
			Control	Experimental	Total
Successfulness	Successful dieter	*M*	55	85	69
		SD	78	97	88
	Unsuccessful dieter	*M*	62	84	74
		SD	70	117	98
	Total	*M*	58	84	71
		SD	74	105	92

Discussion

Successful dieters have an association between temptations and their weight watching goal, whereas unsuccessful dieters do not (Fishbach et al., 2003; Papies et al., 2008). When successful dieters are confronted with tempting food cues, their dieting goal becomes mentally activated and they will not give in to their temptation (Fishbach et al., 2003). This is supported by Kroese et al. (2009), who show that people who are confronted with temptations

reported higher goal importance and intentions and were less likely to pick an unhealthy snack. Because the accessibility of a dieting goal upon temptation exposure seems important, the aim of this study was to create a mental association between the personal temptation and the dieting goal and consequently a more accessible dieting goal in unsuccessful dieters. This was done by creating an association between a personal temptation and a dieting goal. Implementation intentions were used to create this association.

The dieting goal was expected to be more accessible for successful dieters than for unsuccessful dieters, after being primed with their personal temptation. This expectation was based on Papies et al. (2008). No main effect of dieting success was found. There was no difference in RT on the critical trial and consequently no difference in goal accessibility between unsuccessful and successful dieters.

The second hypothesis that, after temptation primes, the dieting goal will be more accessible for participants who do make an implementation intention (experimental condition) as compared to participants who do not make an implementation intention (control condition) is as well rejected. The dieting goal did not become more accessible for participants in the experimental condition.

The expected interaction-effect was that the effect of condition (experimental vs. control) is dependent on the successfulness of dieting (successful vs. unsuccessful), where the advantage of the experimental condition is only expected for unsuccessful dieters. A marginally significant interaction effect was found, but not as hypothesized: the dieting goal was more accessible in the unsuccessful dieters in the control condition. This hypothesis is thereby rejected.

The last hypothesis concerned behavioral effects. This hypothesis was based on the study of Adriaanse et al. (2009), who showed that after making an implementation intention in which participants plan to eat a healthy snack, participants who did make an

implementation intention took less unhealthy and more healthy snacks than participants who did not make an implementation intention. The expectation was that the advantage of the experimental condition would be found only for the unsuccessful dieters. Unsuccessful dieters in the control condition were expected to be the only group not to have a natural or created association and that is why they were expected to take the most candy. No differences were found here.

Remarkably, all hypotheses are rejected. The study used a LDT comparable to the task used by Fishbach et al. (2003) to measure goal accessibility. Furthermore it used the same questionnaires for subjective value and self-regulatory success as Fishbach et al. (2003). In addition, the creation of the implementation intention was based on Gollwitzer's (1993) work. Findings from previous studies (Fishbach et al., 2003; Papies et al., 2008), showed that after being primed with temptation, the dieting goal was more accessible in successful dieters, are not replicated. Next to the cognitive aspect Gollwitzer (1993) used, this study also used a behavioral aspect, thereby making this study the first to combine both aspects of implementation intentions in combination with personal temptations.

Although the major part of the questionnaires and other aspects were based on previous studies, this study did not replicate their findings or what was expected. This could be caused by the implementation intention that was used. Normally, implementation intentions contain a specific situation and a specific behavior (Gollwitzer, 1999). Not only Verplanken and Faes (1999), but also Armitage (2007) used an implementation intention that contained *eating healthy food,* which shows the behavior that has to take place is *eating* healthy food. In the current study, in stead of using a specific behavior, *'think about my dieting goal*' was used. This may have activated a *thinking* process, rather than the dieting goal. No behavior was attached to this thinking process. This part of the implementation intention could also be the cause of the less accessible dieting goal (long RT's on the critical

trial) in the unsuccessful dieters in the experimental condition compared to the unsuccessful dieters in the control condition. Because the participants had made an implementation intention to think, this was what they did when they were primed with their personal temptation. The participants activated a thinking process and were still busy processing while they were expected to react on the trial. The implementation intention might have slowed them down. Remarkably, the unsuccessful dieters in the experimental condition did not only have a less accessible dieting goal (measured by the critical trial), they also performed more slowly at the neutral trials compared to the unsuccessful dieters in the control condition. This shows the unsuccessful dieters in the experimental condition performed more slowly overall, in turn suggesting that the implementation intention activates a thinking process that disturbed all RT's on the LDT of unsuccessful dieters.

These longer RT's could also be interpreted differently. There might not be a less accessible dieting goal, but just another way to reach this dieting goal. It is known that as a result of using implementation intentions, situations become *automatically* associated to a specific behavior (Gollwitzer, 1999). When people are confronted with the specific situation, the planned behavior is automatically, implicitly, activated. Regarding it as such, longer RT's might not be such a malicious thing. There might be a second way to create an association: an explicit one, where people become conscious about their goal and have to make a decision whether or not to give in to their temptation. The existence of more than one way seems to be reasonable. It is already known that a dual-route model of reading exists (Coltheart, Rastle, Perry, Langdom & Ziegler, 2001), consisting of a lexical and a nonlexical route.

Considering the results of Koestner, Horberg, Gaudreau, Powers, Di Dio, Bryan, Jochum and Salter (2006), there might be another explanation. They suggest that autonomy support stimulates successful goal pursuit because it allows individuals to integrate their implementation intentions in a self-concordant manner that highlights interest and personal

meaning rather than pressure and obligation. In other words, 'forcing' participants to create an implementation intention is not as successful as creating an implementation intention combined with either autonomy support or self-efficacy boosting. This has shown to result in greater goal-progress (Koestner et al., 2006).

Another point for improvement is the internal validity of the questionnaires that are used. Some important questionnaires in the current study (namely attractiveness of the personal temptation and subjective value) turned out not to have this internal validity, which results in confounded information.

For future studies it is also important to pay attention to the behavioral aspect of the study. During this study the participants were asked to list a personal temptation. At the end of the experiment, the participants were given the opportunity to take some candy, which often did not match the personal temptation. Because the candy and the personal temptation did not match, being primed with the candy would not activate the implementation intention. This in turn would not activate thinking of the dieting goal. In future studies, the behavioral component should have a better connection with the personal temptation.

Although this study did not show what was hoped for, there are still reasons to believe creating a more accessible dieting goal in unsuccessful dieters could work to activate a dieting goal. Though, more facts have to be taken into consideration. By activating a thinking process, the dieting goal is either not activated, or it is activated in a different manner. Besides, the participants cannot be forced to create an implementation intention that is not their own. Perhaps implementation intentions are not the right way to create an association directly with a goal or if they are, they certainly have to be formulated differently. After adjusting these aspects, there might be a totally different outcome on the expectations that were used here.

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