Future-oriented Self-Regulation in Eating Behavior

Charlotte D.W. Vinkers

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Future-oriented Self-Regulation in Eating Behavior

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Charlotte Dorothea Wilhelmina Vinkers
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Promotor: Prof. dr. D.T.D. de Ridder

Co-promotor: Dr. M.A. Adriaanse

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Chapter 1:
General Introduction

When people resolve to change their unhealthy eating behavior, most tend to look to the future with rose-colored glasses. They think about parading on the beach with their brand-new slim bodies, fantasize about the admiration and compliments that will ensue, and smile at the thought of how the excess pounds will be shed in the blink of an eye and without considerable effort. With their eyes on the prize, however, people tend to overlook that the road to successful behavior change is rife with many obstacles and setbacks. The presence of obstacles seems both undeniable and inevitable: the temptation to indulge in delicious but unhealthy food lurks around every corner in our food-rich environment, and even a person with iron willpower will cave in eventually and have the occasional splurge on their favorite treat. Although relentless optimism about the ease, speed, and outcomes of successful behavior change may be a driving force behind getting started, it is questionable whether it is wise to selectively ignore that obstacles will be encountered during an attempt to change eating behavior. The stoic denial of obstacles, after all, may leave people hopelessly unprepared to ward off the overwhelming pull to abandon good intentions when those obstacles cross their path. If only people would brace themselves for future obstacles, they would stand a better chance to keep to the straight and narrow and prevent a lapse into old unwanted behavior. This implies that people may stand to gain from a future outlook on eating behavior change that includes not only the good, but also the bad and the ugly.

Although the anticipation of – and preparation for – obstacles seems a viable way to help people achieve more success in changing their eating behavior, it has received surprisingly little research attention. In this dissertation, we will address issues regarding the anticipation and preparation for future obstacles in the context of successful self-regulation of eating behavior. Before we outline the specific aims of this dissertation, we first provide an overview of empirical and theoretical work to provide a background and to discuss the issues that have not been clearly addressed so far.

The trouble with self-regulation of eating behavior

It is almost a truism to state that eating behavior is difficult to change. The most visible proof of people's struggle with keeping their eating behavior under control is the alarmingly high prevalence of obesity. In the Netherlands, almost 50 % of adults are overweight or obese (Centraal Bureau voor de Statistiek [CBS], 2012). This 'obesity epidemic' has been growing exponentially for the past decades in most Western

countries, with serious and dangerous consequences for people's health, such as an increased risk for chronic illnesses like diabetes and cardiovascular diseases (Kopelman, 2007). Clearly, there is an urgent need for a solution to this problem. However, although many people try to change their unhealthy eating behavior, most attempts do not only fail to produce the desired weight loss, but even result in weight gain (Mann, Tomiyama, Westling, Lew, Samuels, & Chatman, 2007; Jeffery et al., 2000). This is not only true for self-directed attempts (e.g., following a Sonja Bakker diet), but also for interventions that are based on scientific knowledge about the predictors and processes associated with behavior change. That is, the effectiveness of most interventions has proven modest at best and differs widely between individuals (Brownell, 2010). Thus, at present, for people who want to change their unhealthy eating behavior, their chances of success are slim.

In the past decades, extant research has been devoted to the question of why the majority of people ultimately fails to successfully change their eating behavior. Much of this research focuses on the psychological processes involved in self-regulation that make it extremely difficult to close the gap between what we are now (e.g., a chubby person who sits on the couch a lot) and what we want for the future (e.g., a fit and slim person who effortlessly runs a marathon). Self-regulation, the process through which people exert control over their thoughts, feelings, and behavioral impulses (Vohs & Baumeister, 2004), can be roughly divided into two components that are crucial to success: goal setting and goal striving (Mann, De Ridder, & Fujita, 2013). The process of goal setting is the first step towards successful goal attainment, during which people commit to a certain desired outcome. Then, people need to get started with acting in line with their goal. Once a person has initiated action, however, he or she also needs to persevere, which holds especially for complex long-term health goals of which eating behavior is a prototypical example. Eating behavior change cannot be achieved by a simple discrete one-time action, but requires that people continuously perform goal-directed behaviors over an extended period of time. This process of goal striving is arguably the hardest part of self-regulation in eating behavior due to the many obstacles and distractions that may lead people astray (Gollwitzer & Sheeran, 2006). These obstacles reside in our so-called 'obesogenic' or even 'toxic' food environment (i.e., the many food temptations that are available and accessible at virtually any time and any place), but also in ourselves (e.g., negative or positive emotional states, social situations,

situations that evoke habitual eating). It is widely acknowledged that a major cause of self-regulation failure is that people are considerably inept in dealing with these obstacles (Gollwitzer & Sheeran, 2006; Muraven & Baumeister, 2000), which necessitates research into ways in which people can be helped with this issue. The central focus point of the present dissertation is therefore on investigating ways to deal with the obstacles that arise during the attempt to change eating behavior.

Dealing with obstacles is not easy

One important reason why people struggle with changing their eating behavior is that when confronted with an obstacle, despite good intentions and strong motivation, they often fail to act in accordance with their long-term goal in favor of short-term gratification (Mischel, 1996). Take, for example, the girl who is determined to cut back on her chocolate intake because she wants to fit in a tight dress for her sister's wedding. When she is being offered a piece of chocolate cake, a self-control conflict ensues between short-term pleasure (i.e., eating cake) and long-term goals (i.e., looking slim). The opposing forces that clash in this conflict are not equally powerful to begin with, however. That is, the hedonic pull of the desire to indulge in a tempting piece of cake has a head start on the more rational push of the wish to fit in a tight dress: the benefits of the tasty treat are immediate and tangible, whereas the benefits of sacrificing the enjoyment of indulgence to fulfill a long-term goal lie somewhere vaguely in the future. It is no wonder, then, that good intentions are readily thrown overboard when confronted with an obstacle such as temptation.

Thus, it seems that when we are confronted with obstacles, the battle between our hedonic impulses and our rational considerations is not a fair fight. This widely accepted notion has led researchers to believe that, rather than relying on strong intentions or our failure-prone competence to exert self-control *in situ*, it may be better to brace for future obstacles in advance (Aspinwall & Taylor, 1997; Baumeister & Tierney, 2011; Gollwitzer, 1999; Fujita & Roberts, 2010; Myrseth & Fishbach, 2009). In other words, it may be more beneficial for effective goal striving to actively anticipate and prevent obstacles from derailing goal pursuit than to passively await them, hoping that if and when they occur, willpower and motivation will be sufficient to counteract the urge to indulge at that particular moment. However, people frequently fail to consider that failure is an option when they resolve to change their eating behavior.

Instead, they typically envision the various benefits that will follow once they have accomplished their goal, which range from reasonable consequences such as an improved figure to more far-fetched fantasies about romantic success (Polivy & Herman, 2002). Also, there is evidence that even when people consider the future course of their behavior change attempt, they picture an idealized version of their goal pursuit and judge the occurrence of impediments as implausible (Newby-Clark, 2005). This indicates that people are unlikely to spontaneously take precautionary measures to brace themselves for future obstacles or to prevent them from occurring. Importantly, it follows that a viable way to help people achieve more success in changing their eating behavior is to explicitly shift their focus to the obstacles that may hamper goal pursuit to ensure that obstacles are anticipated and necessary precautions are taken in advance.

To summarize, people often do not consider potential future obstacles when they want to change their eating behavior, even though foreseeing the occurrence of obstacles is arguably a crucial ingredient for persistent goal pursuit in the service of successful behavior change. To be forearmed, after all, is to be forewarned: one cannot prevent something if it is not anticipated. Yet, despite its potential significance, the phenomenon of obstacle anticipation in striving for long-term health goals has received limited theoretical and empirical attention. In the present dissertation, we address this gap in the literature by examining the effect of anticipating obstacles on goal pursuit in the context of eating behavior and weight management. The basic assumption in the present dissertation is that the anticipation of obstacles during goal pursuit is valuable and helpful to goal pursuit. However, it stands to reason that the daunting outlook on a rocky road that is dominated by obstacles and setbacks may make some people feel despair and discouragement before they even start. After all, if people believe that they are at risk for failure due to the many obstacles that will occur, why would they even try to change their eating behavior in the first place? It is thus likely that there are boundaries to the beneficial effects of the anticipation of obstacles.

Below, we will first discuss the benefits of anticipating and preparing for obstacles during eating behavior change within the general theoretical framework of this dissertation, Proactive Coping Theory (Aspinwall & Taylor, 1997). Then, we will outline in more detail the challenges and costs that may accompany the anticipation of obstacles during striving for the goal to change eating behavior.

Hope for the best, prepare for the worst

The most obvious and important benefit of anticipating obstacles is that it gives people the opportunity to prepare themselves in advance. One line of research demonstrating that a little preparation goes a long way is that of planning, or more specifically, 'implementation intentions' (Gollwitzer, 1999). Implementation intentions are specific if-then plans that specify an anticipated obstacle in the if-part (e.g., 'seeing chocolate') and a coping response to deal with the obstacle in the then-part (e.g., 'distraction'), which results in the plan "If I see chocolate, then I will distract myself!". By planning an intended course of action beforehand, people are less likely to be surprised by the overwhelming urge to give in to temptation when the specified obstacle is encountered. Instead, they follow their planned action without the need for deliberation or conscious intent (Bayer, Achtziger, Gollwitzer, & Moskowitz, 2009). Although ample research attests to the power of preparation via implementation intentions in changing eating behavior (Adriaanse, Vinkers, Hox, De Ridder, & De Wit, 2011), making a specific plan for a specific obstacle is only one of the steps that are involved in effective dealing with future obstacles. In recognition of this issue, Proactive Coping Theory (Aspinwall & Taylor, 1997), the central theoretical framework of the current dissertation, takes a broader perspective on successful obstacle management during long-term goal pursuit.

Proactive coping consists of efforts that people undertake in advance of potentially goal-threatening events to prevent them or to minimize their impact before they (may or may not) occur (Aspinwall & Taylor, 1997). Rather than reacting to obstacles in the here and now (reactive coping), or focusing on one future obstacle that will definitely occur (anticipatory coping), proactive coping entails that people anticipate and prepare for a wide array of potential obstacles, thereby employing a variety of self-regulatory skills to ensure that obstacles will be foreseen, dealt with, and learned from. These future-oriented self-regulatory skills comprise the timely accumulation of resources, careful screening for potential obstacles, accurate detection and appraisal of obstacles, initial coping efforts and the use and elicitation of feedback to assess success in offsetting obstacles. To illustrate the concept of proactive coping, consider John, a middle-aged man who wants to lose a few kilos. To take precautionary measures, he must first make sure that his wife and children are supportive of his intentions (resource accumulation). Then, he has to realize in advance that, for example, his weekly card game with friends is a possible obstacle as there is usually a lot of

unhealthy snack food available (recognition), and determine whether he can do something to keep him from eating these unhealthy snacks (initial appraisal). Subsequently, he must come up with possible strategies to prevent the obstacle from interrupting his goal pursuit, and importantly, act them out. He could, for example, make the decision to skip his weekly card game, bring healthy snacks, or plan a strategy to cope with the temptation (preliminary coping). The process of proactive coping does not stop there, however: it is essential to afterwards evaluate whether his plan has worked, and if not, why (elicitation and use of feedback). Thus, Proactive Coping Theory places the anticipation of and preparation for obstacles before they occur at the heart of successful goal striving.

Great expectations

In addition to eliciting preparatory actions, the anticipation of obstacles may also have beneficial effects on expectations towards goal pursuit and goal attainment. As alluded to above, people have the dubious inclination to ban all thoughts about potential failure when they initiate behavior change, which often results in unrealistically optimistic expectations. Polivy and Herman (2000), in their theory of 'False Hope Syndrome', contend that these inflated positive illusions about the magnitude and course of behavior change are the major culprit in self-regulation failure. Due to these unrealistic expectations, people become trapped in a never-ending vicious cycle of repeated failures, which has detrimental consequences for one's physical (e.g., weight cycling) and psychological well-being (e.g., depression). As a solution, they argue that people would be more successful if only they would temper their expectations towards goal pursuit (Polivy & Herman, 2002). To the extent that unrealistically optimistic expectations are fueled by ignoring the presence and frequency of obstacles during goal pursuit, it suggests that the anticipation of obstacles may exert its beneficial effects by keeping expectations within realistic bounds. In line with this suggestion, empirical work by Oettingen and colleagues demonstrates that the anticipation of obstacles may inject a healthy dose of realism into expectations (e.g., Oettingen, 1996; Oettingen & Mayer, 2002; Oettingen, Pak, & Schnetter, 2001). That is, in a variety of self-regulation domains including eating behavior, it was demonstrated that people who take obstacles into account before they engage in goal pursuit are more successful in goal pursuit than those who only fantasize about the beneficial outcomes (Oettingen, 1996).

Whereas research by Oettingen suggests that the anticipation of obstacles curbs optimistic expectations, there is also evidence that it may *increase* optimistic expectations to yield advantageous effects on goal pursuit. Zhang and Fischbach (2010), for example, in their 'Counteractive Optimism Theory', posit that when people anticipate obstacles, they strategically adjust their expectations upwards as way to mobilize effort and motivation. In a series of studies, they demonstrated that when people anticipated that goal attainment would be difficult rather than easy, they raised their optimistic expectations, presumably to muster the necessary efforts to meet the challenge (Zhang & Fischbach, 2010). The notion that anticipated obstacles have a boosting rather than tempering effect is mirrored in similar propositions that challenges during goal pursuit evoke energization (Brunstein & Gollwitzer, 1996; Carver & Scheier, 2004; Locke & Latham, 2002) and an increase in motivational intensity (Brehm & Self, 1989) to meet the new demands as imposed by the obstacles. Conversely, a lack of obstacles may stifle effort and motivation: it has been shown that if goal attainment is easily attainable, people tend to coast, i.e., relinquish their effort (Carver & Scheier, 2004; Louro, Pieters, & Zeelenberg, 2007). The decision to either increase or decrease the mobilization of resources necessary to secure success (e.g., motivation, optimism and effort) is guided by the principle of resource conservation (Brehm & Self, 1989). That is, people tend to adjust the investment of resources to the demands of the situation at hand: if there are many obstacles, people step up to the plate, and if there are few, they put their feet up.

Regardless of whether the anticipation of obstacles results in lower unrealistic optimism or higher productive optimism and effort, the above described research and theory concur that the anticipation of obstacles is beneficial for the successful achievement of healthy eating goals. However, there may also be downsides and challenges that preclude the straight-forward conclusion that the anticipation of obstacles is the panacea to all self-regulatory problems for all people alike when it comes to eating behavior change. These downsides and challenges are outlined below.

The trouble with anticipating future obstacles

Although much of what people do is based on what they expect in the near (e.g., a meeting at four o'clock) and far future (e.g., having children), they are notoriously bad at predicting what the future will hold (e.g., Kahneman & Tversky, 1996). This inability to

accurately predict the future, together with the inherent uncertainty of the future, makes it difficult to anticipate whether, when and which obstacles will occur. A defining feature of the anticipation of obstacles is the time gap between the moment of anticipation and preparation (now) and the moment that an obstacle actually may or may not be encountered (the future). Consequently, there is no guarantee that an identified potential obstacle will occur and that unidentified obstacles will not occur. Moreover, even if all potential obstacles are accurately identified, preventive measures are by no means an assured ticket to success. For example, if John makes a plan to eat an apple instead of unhealthy snacks during his weekly card game, but there is no apple available, then his preventive action will be in vain.

Uncertainty about the incidence and manifestation of obstacles may make efforts directed at preventing or offsetting obstacles (seem) too costly in terms of time, energy and other resources relative to the gain they may provide (Aspinwall, 2005). As such, efforts to prevent obstacles may resemble more of a shotgun approach that hinges predominantly on luck rather than a clear, directed and systematic way to promote goal pursuit. An important complicating factor is that people have persistent positive illusions about their ability to restrain themselves in the face of temptation (Loewenstein, 1996). To illustrate, in a compelling series of studies, Nordgren and colleagues (2009) demonstrated that people underestimate the likelihood that they will fall prey to the overwhelming pull of temptation in the future, which leads them to forgo preventive measures and expose themselves freely to temptation (Nordgren, Van Harreveld, & Van der Pligt, 2009). From the above follows that the anticipation of obstacles is difficult, which suggests that people may not necessarily be unwilling to face the fact that obstacles will occur, but that they are particularly unable to do so. This indicates that it is important to provide people with guidance and support in recognizing future obstacles.

In addition to the fact that the anticipation of obstacles is difficult, it may also have direct and immediate negative consequences for people's willingness to engage in goal pursuit in the first place. That is, the daunting outlook on the many obstacles down the road may overwhelm and discourage people to such an extent that they no longer believe that it is worthwhile to expend any effort (Clark, Pera, Goldstein, Thebarge, & Guise, 1996; Prochaska et al., 1994). People are, after all, not always blind to logic: the more difficult goal pursuit will be due to its many obstacles, the smaller the likelihood

that behavior change will be successfully achieved and maintained. As it makes little sense to expend valuable resources (e.g., time, effort) on a lost cause, it may be smarter to withdraw effort and motivation and give up than to bet on a horse that cannot win (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). In line with this suggestion, research demonstrates that when it comes to foreseeing obstacles during goal pursuit, it is of utmost importance to not lose sight of the potential benefits that goal attainment may bring about (e.g., Oettingen, 1996). Another negative effect of obstacle anticipation may be its immediate effects on people's emotional state: the sense of dread and worry that is likely to follow thoughts about obstacles and failure may lead people to 'freeze', thereby preventing rather than promoting efforts to actively prepare for a potential negative future (Aspinwall & Taylor, 1997). Thus, the prospect of future obstacles may dampen motivation and provoke debilitating anxiety, which may lead people to abandon their attempt to change their eating behavior altogether.

Proactive coping: obstacle management as self-regulatory skill

Although many self-regulation theories acknowledge that obstacles arise during goal pursuit and it is important to overcome them, they are surprisingly silent about viable ways to successfully deal with anticipated obstacles. Research has mostly focused on the immediate moment of confrontation with an obstacle, examining only factors that influence whether people's self-regulation efforts fail when directly confronted with an obstacle such as temptation (e.g., Baumeister & Heatherton, 1996; Metcalfe & Mischel, 1999). As a result, there is little research examining the self-regulatory strategies that people can employ in advance to reduce or even obviate the need for self-regulation at the moment that an obstacle is encountered. As alluded to above, the anticipation and preparation for obstacles before they occur, more broadly incorporated under the concept of proactive coping (Aspinwall & Taylor, 1997), may be a viable way to help people prevent self-regulatory failure when an obstacle is encountered. Although the literature as outlined above suggests that the anticipation of obstacles may have a discouraging influence on people, proactive coping may counteract this negative effect by its focus on active preparation for obstacles in addition to anticipation. Moreover, when people engage in proactive coping, they identify and deal with obstacles one at a time, which may make the outlook on obstacles less daunting than when people simply foresee *that* they will be confronted with a

variety of obstacles. It is therefore likely that proactive coping, during which anticipation and preparation for obstacles are both equally crucial steps, is helpful in dealing with obstacles when they occur, thereby fostering success in eating behavior change.

With the assumption that proactive coping is beneficial to eating behavior change, the question arises whether the actions associated with proactive coping, such as screening, monitoring and planning, can be taught and developed as a set of self-regulatory skills. If people can learn how to anticipate and actively prepare for the obstacles that will arise, they may have a powerful tool to prevent self-regulatory failure in advance that lasts them a lifetime. Some studies indicate that people are able to develop future-oriented self-regulatory skills that help them deal with obstacles. For instance, well-known behavioral treatments for addictive behaviors (e.g., smoking, alcohol intake) such as relapse prevention training (Marlatt & Gordon, 1985) and problem solving treatment (D'Zurilla & Nezu, 1999) are built on the premise that people are capable of developing skills to prepare for obstacles that lure people into old, unwanted behavior. Importantly, these approaches have been shown to produce advantageous effects on successful weight management in obesity treatment (e.g., Murawski et al., 2009; Perri, Nezu, McKelvey, Shermer, Renjilian, & Viegener, 2001). Similarly, in a population with overweight and obese type 2 diabetes patients, Thoolen and colleagues showed that the improvement in proactive coping skills yielded beneficial effects on successful weight management up to nine months after the intervention (Thoolen, De Ridder, Bensing, Gorter, & Rutten, 2009). However, this intervention was implemented in a population with diabetes patients: having diabetes involves considerable impairment in functioning, which may increase the urgency of behavior change. People who are 'just' at risk for diabetes may feel less urgency to change their eating behavior, as the potential burden of living with a chronic disease is perceived as remote and abstract. This suggests that research findings on diabetes patients cannot readily be extrapolated to a population without diabetes. It is therefore important to examine whether advantageous effects also accrue from an intervention aimed at improving proactive coping skills for a population of overweight and obese people without diabetes.

Aims

The main objective of the current dissertation is to increase our understanding of how the anticipation and preparation for future obstacles influences eating behavior change, as knowledge on this matter is limited at present. As noted above, Proactive Coping Theory (Aspinwall & Taylor, 1997) is the central theoretical framework of this dissertation, which posits that anticipating and preparing for obstacles plays an important beneficial role in successful self-regulation. We will investigate this basic tenet by conducting a series of experimental and field studies in both student and community samples. In the first part of this dissertation (Chapters 2-3), we will examine the two most important elements of proactive coping (i.e., anticipation and preparation) employing experimental designs within a lab setting. In the second part of this dissertation (Chapters 4-6), we will shift towards examining the value of anticipating and preparing for obstacles, i.e., proactive coping, in the context of an overweight and obese sample participating in a weight management intervention.

By employing different samples and research contexts, the current dissertation aims to advance a thorough and integrated understanding of the issues surrounding the management of future obstacles in eating behavior change. The controlled experimental lab studies allow for drawing causal conclusions, and our intervention research yields knowledge that has considerable ecological validity. As such, the current dissertation has both theoretical and practical value by gaining insight in how people can effectively deal with obstacles in advance in the context of eating behavior. Increasing knowledge on this matter is important considering the fact that attempts to resist the alluring pull of unhealthy foods often fail when directly confronted with them (Baumeister & Tierney, 2011).

Overview of Chapters

In the first chapter, Chapter 2, we will investigate the effects of merely anticipating obstacles – without active and deliberate preparation at the same time – on (expectations towards) successful eating behavior change. To that end, we experimentally manipulated perceived goal difficulty as an operationalization of anticipated obstacles (easy vs. difficult), and measured its effects on immediate optimistic expectations (Study 2.1 and 2.2) and on perceived (Study 2.1) and actual (Study 2.2) success in limiting unhealthy snacking behavior a week later using a 7-day

snack diary. Importantly, we propose that positive self-beliefs (e.g., self-efficacy) may counteract the potential discouraging effects of anticipating obstacles at the start of eating behavior change. We therefore predict that the outlook on difficult goal pursuit, presumably rife with obstacles, only decreases participants' optimistic expectations when they do not believe in their success in the first place.

In Chapter 3, we move from anticipation to preparation for obstacles, thereby focusing on the most widely used preparatory strategy to effectively deal with obstacles in advance, implementation intentions (Gollwitzer, 1999). Specifically, we aim to investigate whether it is beneficial for goal pursuit to prepare for the possibility that a planned coping response goes awry once the obstacle is encountered (e.g., planning to eat an apple instead of chocolate, but apples are unavailable *in situ*). In two experimental lab studies, we test our hypothesis that planning more than one coping response for an anticipated obstacle, 'making a Plan B', is detrimental to self-regulatory success in eating behavior compared to making one or no plan (Study 3.2), and investigate the underlying cognitive mechanisms for this effect (Study 3.1 and 3.2).

From Chapter 4 on, we shift our focus from examining a young female student population in experimental lab settings to an overweight and obese population in the context of an intervention study. In Chapter 4, we aim to provide a first indication of the potential value of proactive coping skills. Specifically, we will investigate whether these skills protect people against the harmful consequences of expecting too few obstacles during behavior change, i.e., a lack of preparation. We therefore propose that only when participants have relatively few proactive coping skills at the start of intervention, they reap the potential benefits of anticipating many obstacles in terms of preparation. This proposition will be tested by measuring the effects of participants' level of proactive coping skills and the anticipated number of obstacles at the start of intervention on successful weight management two months later.

In Chapter 5, we will examine whether proactive coping skills can be successfully developed in an overweight and obese population. Also, we will provide the critical test of the viability of the proactive coping approach by investigating whether the intervention, aimed at the development of proactive coping skills, yields the proposed beneficial effects on behavior change. We hypothesize that intervention participants are more successful in improving proactive coping skills, diet, and weight (the three primary outcomes) from baseline to a year later, as compared to a control group.

As the viability of an approach does not only depend on beneficial outcomes, but also on the extent to which people perceive the approach as feasible and appealing, in the final chapter, Chapter 6, we will take a closer look at the participants who prematurely discontinued the intervention. Specifically, we will explore the characteristics of participants who dropped out during different stages of the intervention, as compared to those who completed the intervention. We thereby focus not only on baseline characteristics but also on changes during intervention, and importantly, we include psychological characteristics (e.g., self-efficacy, motivation) in addition to the typically examined anthropometric (e.g., BMI) and sociodemographic (e.g., gender) characteristics.

In the final chapter of this dissertation, Chapter 7, the main findings of the empirical chapters will be summarized and discussed. In particular, we will address unresolved issues with regard to the anticipation and preparation for obstacles in eating behavior change, and give specific attention to the theoretical contribution and implications of the studies described in this dissertation. Finally, we provide limitations and future directions for research.

Chapter 2:

Easy does it:

The interplay between perceived goal difficulty and positive self-beliefs in striving towards success in health goals

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Abstract

Objective Aim of the present studies was to examine how the perceived difficulty of health behavior change interacts with self-beliefs (e.g., self-efficacy) to determine (expectations towards) success in health goal striving

Design In two studies, perceived goal difficulty (easy vs. difficult) was manipulated to assess its interplay with positive self-beliefs (high vs. low) relevant to the goal of limiting unhealthy snacking behavior in a female student population.

Main Outcome Measures The primary outcome measure was expectations towards successful goal adherence. Experienced success over the course of one week was explored as a secondary outcome variable.

Results Both studies demonstrated that when the goal of limiting unhealthy eating was perceived to be difficult, participants with low (vs. high) positive self-beliefs lowered success expectations. A perceived easy goal did not differentially influence expected success for participants with low and high positive self-beliefs. Although Study 1 showed similar effects on experienced success, Study 2 failed to replicate this finding.

Conclusion It is concluded that believing that health behavior change will be easy rather than difficult is beneficial to people with a low level of positive self-beliefs. Findings thus call for a shift in research from the focus on self-beliefs to goal-beliefs to help people initiate health behavior change.

Health behavior change is notoriously difficult. When people strive for long-term health goals such as weight loss or smoking cessation, they have to battle against strong impulses and firmly established habits over an extended period of time (Verhoeven, Adriaanse, Evers, & De Ridder, 2012). Indeed, research shows that the majority of attempts to achieve long-lasting health behavior change fail, especially when it involves diminishing unhealthy eating and losing weight (Mann, Tomiyama, Westling, Lew, Samuels, & Chatman, 2007; Jeffery et al., 2000) and undertaking regular exercise after a sedentary life (Hillsdon, Foster, & Thorogood, 2005). As the difficulty of health behavior change clearly points towards small chances of success, it is puzzling that so many people keep trying to change their health behavior (Polivy & Herman, 2002). Surprisingly, little is known about whether and how the perceived difficulty of health behavior change affects people's expectations and behavior. Although the prospect of such a difficult long-term goal should logically temper positive expectations towards success and discourage people from putting effort into behavior change, research shows that difficult goals may also increase optimistic expectations, leading people to boost rather than relinquish their effort towards goal achievement (Zhang & Fishbach, 2010). In the present research, we aim to elucidate the role of perceived goal difficulty in (expected) success in health behavior change. Specifically, we examine the interplay between goal-beliefs (i.e., perceived goal difficulty) and self-beliefs (e.g., self-efficacy) in determining expectations towards success in goal striving in the context of changing unhealthy eating behavior. In addition, we explore the effect of goal-beliefs and self-beliefs on actual success.

From a rational viewpoint, the prospect of a difficult long-term goal such as health behavior change should have negative consequences for people's estimated likelihood of success (success expectations) and subsequent actual success. As the objective small likelihood of successful attainment of a difficult goal cannot easily be discounted in subjective appraisals, difficult goals should logically lower people's expectations towards successful goal attainment (Tubbs, Boehne, & Dahl, 1993). However, research on the role of goal difficulty in goal pursuit points towards the opposite: difficult goals have an energizing function, leading people to increase, rather than decrease, their expectations and effort expenditure (Locke & Latham, 2002). To illustrate, in a compelling series of studies, Zhang and Fishbach (2010) demonstrated that the prospect of a difficult goal, compared to an easy goal, actually increased

optimistic expectations, which in turn led to more success in goal pursuit. To explain this counterintuitive finding, the authors propose that people strategically heighten their expectations in the face of a difficult goal as a way to mobilize motivation and effort. It is unknown, however, whether such an effect – the increase of expected success in response to higher perceived goal difficulty – also occurs for health goals. To date, the role of goal difficulty in goal pursuit has been extensively examined in the context of goal-setting research (Locke & Latham, 2002), which typically takes place in organizational and learning performance settings with novel, simple, and short-term goals. To our knowledge, the influence of perceived goal difficulty on goal pursuit in the context of complex and long-term goals such as health behavior change has received little research attention.

Although the research outlined above seems to imply a positive linear association between goal difficulty and expected success, it is unlikely that higher perceived goal difficulty invariably leads to more optimistic expectations. This may be especially true for long-term health goals, for which the prospect of the barriers, problems and costs that goal pursuit brings about has a well-known discouraging influence on people's willingness to initiate change (Clark, Pera, Goldstein, Thebarge, & Guise, 1996; Prochaska et al., 1994). It stands to reason that there are boundary conditions that determine whether a difficult goal is too difficult, resulting in lowered expectations and effort withdrawal, or whether a difficult goal forms a source of aspiration, leading to heightened expectations and effort mobilization. As expectations are not only formulated on the basis of knowledge about the goal, but also on relevant knowledge about the self that has been acquired through previous attempts at goal pursuit (Eccles & Wigfield, 2002; Locke & Latham, 2002), we propose that self-beliefs constitute such a boundary condition to the positive influence of difficult goals on expectations and success in long-term goal pursuit. Specifically, we argue that positive self-beliefs moderate the link between perceived goal difficulty and expected success.

Positive self-beliefs encompass a wide variety of beliefs about the self, such as confidence in one's ability to execute desired actions (i.e. self-efficacy; Bandura, 2004), the perceived ability to overcome potential barriers to perform goal-directed behavior (i.e., barrier efficacy; DuCharme & Brawley, 1995), and perceptions of one's success with goal pursuit based on prior attempts (i.e., perceived successfulness). Extant research has demonstrated the beneficial effect of positive self-beliefs on successful

health behavior change (Schwarzer, 2004). To illustrate, when people have positive self-beliefs about their ability to lose weight (Linde, Rothman, Baldwin, & Jeffery, 2006) or increase their physical activity levels (McAuley, Pena, & Jerome, 2001) they are likely to have optimistic success expectations and achieve actual success. Although positive self-beliefs and goal difficulty may be related constructs, positive self-beliefs are not necessarily inversely proportional to perceived goal difficulty: if people have positive self-beliefs towards pursuing a goal, it does not necessarily mean that they think that goal attainment is easy. Rather, it has been proposed that people with positive self-beliefs think that they are able to attain the goal, even if goal attainment is perceived to be difficult (Schwarzer, 2004). This suggests that positive self-beliefs may be a protective factor against the intimidating and possibly disheartening outlook on a difficult long-term goal.

We posit that people with a high level of positive self-beliefs are unlikely to be fazed by the prospect of a difficult goal: the difficult goal is perceived as a challenge rather than a threat (Drach-Zahavy & Erez, 2002), which secures or may even boost optimistic expectations towards goal pursuit. These expectations are likely to be different in people with a low level of positive self-beliefs when confronted with a difficult goal, who may have trouble fostering optimistic expectations when their self-beliefs give little reason to do so. We therefore hypothesize that an anticipated difficult goal results in greater expected success in people with a high level of positive self-beliefs than in people with a low level of such beliefs. Indirect support for this proposition comes from Goal Setting Theory and studies demonstrating that people with high self-efficacy set more difficult goals for themselves (cf. Locke & Latham, 2002). This suggests that difficult goals have no detrimental effects on expected success when positive self-beliefs justify these optimistic expectations. In contrast, we expect an anticipated easy goal to render equally optimistic success expectations for people with low and high levels of positive self-beliefs. Easy goals may counteract the self-doubts of people with a low level of positive self-beliefs and increase their success expectations despite their perceived inability to realize goal attainment, rendering their expectations to be similar to those of people with a high level of positive self-beliefs.

To summarize, we aimed to investigate whether perceived goal difficulty influences success expectations in the context of a long-term health goal and whether positive self-beliefs moderate these effects. We also explore the interplay between

perceived goal difficulty and positive self-beliefs in determining actual success in goal striving. In two studies, we experimentally manipulated perceived goal difficulty to examine its interplay with self-beliefs in the context of reducing unhealthy eating. We tested our hypothesis in the context of unhealthy eating behavior, as it represents a typical long-term health goal that many people struggle with on a daily basis. With these studies, we advance the literature in two important ways. First, little is known about whether and how perceived goal difficulty affects people's expectations and success in health behavior change. Whereas the literature on health behavior change has mostly focused on self-beliefs in isolation, the knowledge on goal-beliefs mostly stems from research on short-term and simple performance goals. In the present studies, we integrate the literature on self-beliefs and goal-beliefs by examining their combined influence on complex long-term goal pursuit. Thereby, we gain a better understanding of which factors contribute to people's (un)willingness to change their health behavior, that can be used in interventions to help people achieve success. Second, our study uniquely contributes to the existing literature by manipulating rather than measuring perceived goal difficulty and examining its effects over the course of one week. Consequently, we obtain not only more insight in the causal mechanisms underlying the effects of goal difficulty, but also in the effects of easy goals on (expected) success that have seldom been a topic of research interest within the health domain.

Study 1

In Study 1, we investigated whether positive self-beliefs moderate the link between perceived goal difficulty and (expected) success in the context of unhealthy snacking behavior. The construct of positive self-beliefs was operationalized as the extent to which participants considered themselves as successful in limiting their unhealthy snacking behavior (perceived successfulness). Perceived goal difficulty (easy vs. difficult) was manipulated by presenting participants with a persuasive article. As our manipulation of goal difficulty explicitly elicited social comparisons with others, participants reported their expected and experienced success (a week later) in comparison with a referent group that was similar to themselves (cf. Zhang & Fishbach, 2010). In addition, participants rated their absolute likelihood of successful goal adherence without a referent group. We expected that the perceived high difficulty of limiting snacking behavior would lead to lower success expectations and actual success in participants with a low (vs. high) level of perceived successfulness. In contrast, we

expected that when the goal was perceived to be easy, participants with a low and high level of perceived successfulness would have equally high success expectations.

Method

Participants and Design. Only females were included as they differ considerably from men in their (attitudes towards) eating behavior (Wardle et al., 2004). The experiment had a 2 (goal difficulty: easy vs. difficult) X 2 (positive self-beliefs: low vs. high) design. In total, 81 women were recruited to participate, of which 78 completed both sessions. The sample had a mean age of 22.94 years (*SD* = 3.23) and mean BMI of 21.51 (*SD* = 2.43). Overall, participants had a moderate intention to limit their unhealthy snacking behavior (*M* = 4.67, *SD* = 1.88), and perceived themselves as moderately successful (*M* = 4.47, *SD* = 1.65).

Procedure. Upon arrival at the laboratory, participants were informed they would participate in three unrelated studies. All studies were paper-and-pencil studies, with a different style, font and font size so as to make their unrelatedness credible. The first study was about lifestyle and health (see 'baseline questionnaire' under 'Materials'). To conceal our interest in eating behavior, the questions about unhealthy eating behavior (e.g., intention, goal commitment) were embedded in a series of questions about other self-regulation domains (e.g., exercise, alcohol, studying). The second study was a filler task about 'memory categorization'. This task was included to make participants believe that their return a week later concerned this task rather than our true interest, i.e., their eating behavior. The concealment of our interest in eating behavior was important to prevent participants from adjusting their success expectations as a function of expected external evaluation (Tetlock & Lerner, 1999). In the third and final study, the manipulation of anticipated goal difficulty as described in the pilot study (see below) was administered, after which participants were asked to formulate expectations about their unhealthy snacking behavior in the coming week (see 'expected success' below). A week later, upon return, participants were asked about the memory task from the previous week to keep the cover story believable. Next, questions were asked about their experience with and success in diminishing their unhealthy snacking behavior in the previous week (see 'experienced success' below). As an extra manipulation check, participants indicated whether they remembered the article (constituting the manipulation) they read last week, and the extent to which they found its results credible.

Materials.

Manipulation Goal Difficulty. The manipulation consisted of a summary of an article, written in English, from the popular-scientific magazine 'Observer'. This article presented scientific evidence from a large longitudinal study showing that limiting unhealthy eating behavior was, depending on the assigned condition, easier or even more difficult than previously thought. To make the content believable and relevant for our target sample (i.e., young, healthy-weight women), it was emphasized that the research presented in the article, in contrast to previous studies, examined a representative sample, including younger people with a healthy weight. For both conditions, the article was the same in length and content, except for 8 instances referring to the ease or difficulty of sticking to healthy eating intentions.

Pilot study. To test the validity of the manipulation, 40 female participants were approached on the university campus with a mean age of 21.10 years (SD = 1.85) and a mean BMI of 21.68 (SD = 2.50). The study was ostensibly about English language comprehension in Dutch students. After participants were randomly assigned to an 'easy' and a 'difficult' condition, they were presented with the article as described above. Participants were instructed to underline the three most important sentences in the article after reading it. Afterwards, they rated how difficult it would be to adhere to the goal of diminishing unhealthy snacking. An ANOVA showed that, as expected, the difficult condition found it more difficult to adhere to the goal of diminishing unhealthy snacking (M = 5.10, SD = 1.25) than the easy condition (M = 3.35, SD = 1.31), $F(1,38) = 18.67$, $p < .01$. The manipulation was thus successful.

Baseline questionnaire. Baseline questions were all measured by 1 item with a 7-point scale ranging from 1(*not at all*) to 7(*very much*). *Perceived successfulness*, the operationalization of positive self-beliefs in this study, was measured by 'To what extent are you successful in limiting your unhealthy snacking behavior?'. *Intention* was measured by 'To what extent do you have the goal to diminish your unhealthy snacking behavior in the coming time?'. *Goal commitment* was measured by 'To what extent would you be disappointed if you do not succeed in diminishing your unhealthy snacking behavior?' (cf. Oettingen, Pak, & Schnetter, 2001).

Expected Success. *Expected comparative success* was measured by two items, which assessed participants' perceived likelihood of success in diminishing unhealthy snacking behavior in comparison with women of their age who also had the goal to limit

snacking behavior. They were asked to fill out a percentage (see Zhang & Fishbach, 2010). Example item: 'The likelihood that I will succeed in adhering to my goal is higher than …% of all women my age who have this goal', $r = .73$, $p < .01$. *Expected absolute success* was measured by one item, which comprised filling out a percentage considering the absolute likelihood of success without a comparison group; 'The likelihood that I will succeed in limiting unhealthy snacking behavior is …%'.

Experienced success. *Experienced success* was measured by two items, which assessed subjective experienced success in the prior week in comparison with the same referent group as used during prediction formation (i.e. women of same age who also had the goal to limit snacking behavior). Again, participants filled out a percentage. Example item 'In the previous week I was more successful in adhering to the goal than … % of women my age who have this goal', $r = .87$, $p < .01$.

Credibility of article. Three items assessed whether participants found the study described in the article believable, convincing, and trustworthy on 7-point scales ranging from 1(*not at all*) to 7(*very much*); $\alpha = .87$.

Results

Randomization check. Multiple ANOVAs were conducted to check whether randomization was successful. The results show that the easy condition had a lower BMI, $M = 20.90$, $SD = 1.97$, than the difficult condition, $M = 22.11$, $SD = 2.71$, $p = .03$, as well as lower goal commitment at baseline, $M_{\text{easy}} = 3.87$, $SD = 1.45$; $M_{\text{difficult}} = 4.82$, $SD = 1.45$, $p < .01$. The conditions did not differ in intention, perceived successfulness, and age, all ps $\geq .15$. BMI and commitment are included in all analyses as covariates.

Check credibility of article. An ANOVA, analyzing participants who correctly remembered the content of the article a week later (92.3 % in the easy condition and 100 % in the difficult condition), showed that participants in the easy ($M = 4.94$, $SD = 1.22$) and difficult ($M = 5.05$, $SD = .57$) condition found the bogus article equally credible, $t(48.75) = -.48$, $p = .63$.

Expected comparative success. Prior to analysis, all variables were mean-centered (Aiken & West, 1991). Regression analysis showed that there were no main effects of condition nor of perceived successfulness, ps $> .33$. The interaction-effect was marginally significant, $\beta = .32$, $p = .057$. Separate regression analyses (Aiken & West, 1991) revealed that in the easy condition, perceived successfulness was not associated with expected success, $\beta = -.07$, $p = .65$. As expected, in the difficult condition, however,

higher perceived successfulness yielded more optimistic expectations, $\beta = .34$, $p = .03$. See Figure 1 for the means of expected comparative success at high (+ 1 SD) and low (- 1 SD) levels of perceived successfulness and the interaction with goal difficulty.

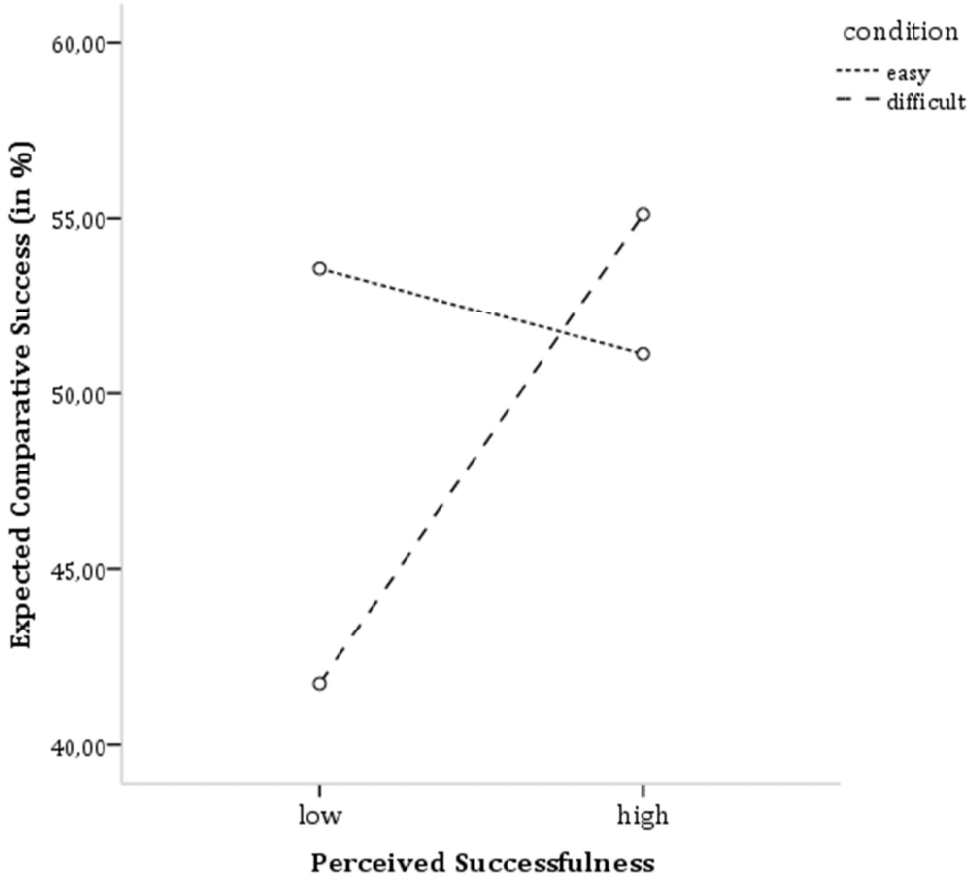

Figure 1. Study 1: Interaction-effect between perceived goal difficulty and perceived successfulness on expected comparative success in percentages.

Expected absolute success. No main effect of perceived successfulness emerged, whereas there was a main effect of condition, $\beta = -.24$, $p = .02$, indicating that the difficult condition, regardless of perceived successfulness, had lower expectations than the easy condition. The interaction-effect was significant, $\beta = .40$, $p = .01$. Separate regression analyses revealed a similar pattern as for expected comparative success: in the easy condition, no effect of perceived successfulness emerged, $p = .74$, whereas in

the difficult condition higher perceived successfulness was related to more optimistic expectations, $\beta = .60$, $p < .01$.

Experienced success. Regression analysis showed that there were no main effects of condition nor of perceived successfulness on experienced success, *p*s > .13. The interaction-effect was significant, $\beta = .36$, $p = .03$. Separate regression analyses revealed that, similar to expected success, in the difficult condition higher perceived successfulness predicted more experienced success, $\beta = .34$, $p = .04$ (see Figure 2). In contrast, perceived successfulness did not differentially influence experienced success in the easy condition, $\beta = -.14$, $p = .39$.

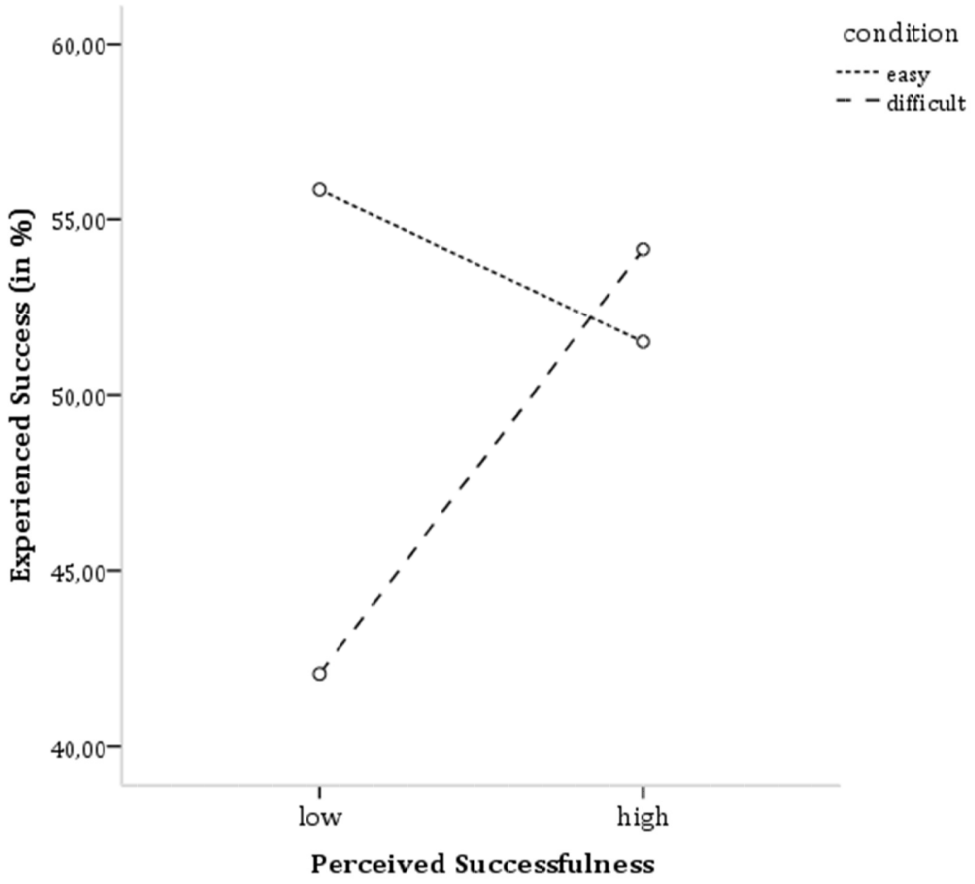

Figure 2. Study 1: Interaction-effect between perceived goal difficulty and perceived successfulness on experienced success in percentages.

Discussion

Study 1 showed that, as hypothesized, positive self-beliefs moderated the relationship between goal difficulty and expectations towards the goal to eat less unhealthy snacks. When faced with a difficult goal, participants with a low level of positive self-beliefs had lower success expectations towards the likelihood of successful goal adherence, both in comparison with similar others and in absolute terms, compared to those harboring more positive self-beliefs. Also in line with expectations, positive self-beliefs did not differentially impact success expectations when participants believed that the goal of limiting unhealthy snack intake would be easy. Findings also show that the same interplay between self-beliefs and goal-beliefs occurred in experienced success a week later. Together, these results suggest that positive self-beliefs may function as a buffer against the discouraging impact of a perceived difficult goal on expectations and actual success in health goal pursuit.

A limitation of Study 1 is that no control group was included; we therefore lack insight in how goal difficulty affects expectations and behavior compared to when no information about goal difficulty is explicitly provided. Another limitation is the reliance on retrospective measures of experienced success, which are sensitive to bias. Study 2 was designed to address these limitations.

Study 2

In Study 2, we aimed to replicate the findings from Study 1 with three important methodological adjustments. First, we included a control group which received no information about goal difficulty. Second, to measure actual success, participants kept track of their snacking behavior by filling out a daily diary. As this precluded the concealment of our interest in eating behavior, we recruited only participants who had the intention to eat less unhealthy snacks. Lastly, we used a different measure of positive self-beliefs. Rather than perceived successfulness, we measured self-efficacy, i.e., beliefs about one's ability to perform desired actions (Bandura, 2004) as this is the most widely studied form of positive self-beliefs in health behavior. As such, findings of Study 2 can be more easily integrated in the existing literature about the role of positive self-beliefs in health behavior change. Because success expectations may be influenced by people's dispositional optimism (Scheier, Carver, & Bridges, 1994), we also included a measure of trait optimism to rule out this alternative explanation.

Method

Participants and Design. The experiment had a 3 (goal difficulty: easy vs. difficult vs. control) X 2 (self-efficacy: low vs. high) design. In total, 91 women were recruited to participate, of which 87 completed both sessions. After excluding three participants who indicated to have participated before, the remaining sample of 84 participants had a mean age of 21.57 years (*SD* = 3.99) and a mean BMI of 22.32 (*SD* = 3.21). Overall, participants had a high intention to limit their unhealthy snacking behavior (*M* = 5.79, *SD* = .95), and had a moderate level of self-efficacy (*M* = 4.26, *SD* = 1.35).

Procedure. Only participants who had the intention to eat less unhealthy snacks were recruited. Upon arrival at the laboratory, participants first filled out baseline questions about their unhealthy snacking behavior (intention, commitment, and self-efficacy). Then, they were told that we were interested in testing the results of a recently published study in a female student population. They were asked to read an article constituting the manipulation of perceived goal difficulty, which stated that changing eating behavior is easy or difficult (depending on condition; see Study 1). In the control condition, participants read a neutral article of the same length about vacation. All participants were asked to underline the three most important sentences to make sure that the content was sufficiently encoded. Afterwards, participants stated their expectations towards successful adherence to the goal. Upon completion, the experimenter instructed participants to keep a snack diary for one week, starting the day after having completed the manipulation (see 'snack diary' below). After one week, participants returned to hand in their snack diary and report their subjective experienced success.

Materials.

Baseline questionnaire. Baseline questions about intention and goal commitment were the same as in Study 1. Self-efficacy was measured by 'To which extent would you consider yourself as a person who is able to successfully change unhealthy eating behavior?' measured on a 7-point scale ranging from 1(*not at all*) to 7(*very much*).

Dispositional Optimism. Dispositional optimism was measured with the Life Orientation Test-Revised (LOT-R; Scheier et al., 1994). The scale consists of six items (and four fillers) rated on a 5-point scale ranging from 0*(strongly disagree)* to 4*(strongly*

agree). Three negatively worded items (e.g., 'I hardly ever expect things to go my way') were reverse scored and averaged with the three remaining items (α = .68).

Manipulation Goal Difficulty. Perceived goal difficulty was manipulated in the same manner as in Study 1.

Expected Success. As in Study 1, *expected comparative success* was measured by two items requiring participants to fill out a percentage of their expected likelihood of success in comparison with a similar referent group, $r = .78$, $p < .01$. Also, participants rated their *expected absolute success* by filling out a percentage concerning their absolute likelihood of success.

Experienced Success. *Experienced success* was measured by the same two items as in Study 1, $r = .89$, $p < .01$.

Snack diary. Participants were provided with a paper diary to keep track of their unhealthy snacking behavior for seven consecutive days. A snack was defined as any (unhealthy) food consumed in between the regular meals (breakfast, lunch, and dinner). The diary, which has been developed in collaboration with a registered dietician and used in several previous studies (cf. Adriaanse, De Ridder, & De Wit, 2009), consisted of 14 options for unhealthy snacks (e.g., cookie or crisps), with two 'other' options, and four options for healthy snacks (e.g., fruit, vegetables). Participants specified how much of that snack they consumed in appropriate units (e.g., a 'handful' for crisps). Participants were instructed to fill out the diary within 30 minutes after each snacking occasion and could report up to six occasions per day. Caloric intake of unhealthy snacks was calculated by multiplying each reported snack by the average amount of kilocalories it contains.

Results

Randomization check. Multiple ANOVAs were conducted to check whether randomization was successful. No differences between the easy and difficult condition emerged in age, BMI, intention, dispositional optimism, and the extent to which participants considered themselves as self-efficacious, all *p*s ≥ .09.

Check credibility of article. An ANOVA, including participants who correctly remembered the content of the article a week later (89.7 % in the easy condition and 93.3 % in the difficult condition), showed that participants in the easy ($M = 4.56$, $SD = .91$) and difficult ($M = 4.63$, $SD = 1.31$) condition found the bogus article equally credible, $F(1,52) = .05$, $p = .83$.

Expected comparative success. A multiple regression analysis showed that there was no main effect of condition, nor of self-efficacy. The interaction-effect was marginally significant, $\beta = .54$, $p = .056$. Separate regression analyses showed that whereas for the easy condition, self-efficacy did not predict expectations towards successful goal pursuit ($\beta = .28$, $p = .14$), for the difficult ($\beta = .33$, $p = .08$) and control ($\beta = .70$, $p < .01$) condition, higher self-efficacy yielded more optimistic expectations (see Figure 3 for means at high (+ 1 SD) and low (- 1 SD) levels of self-efficacy for the three conditions).

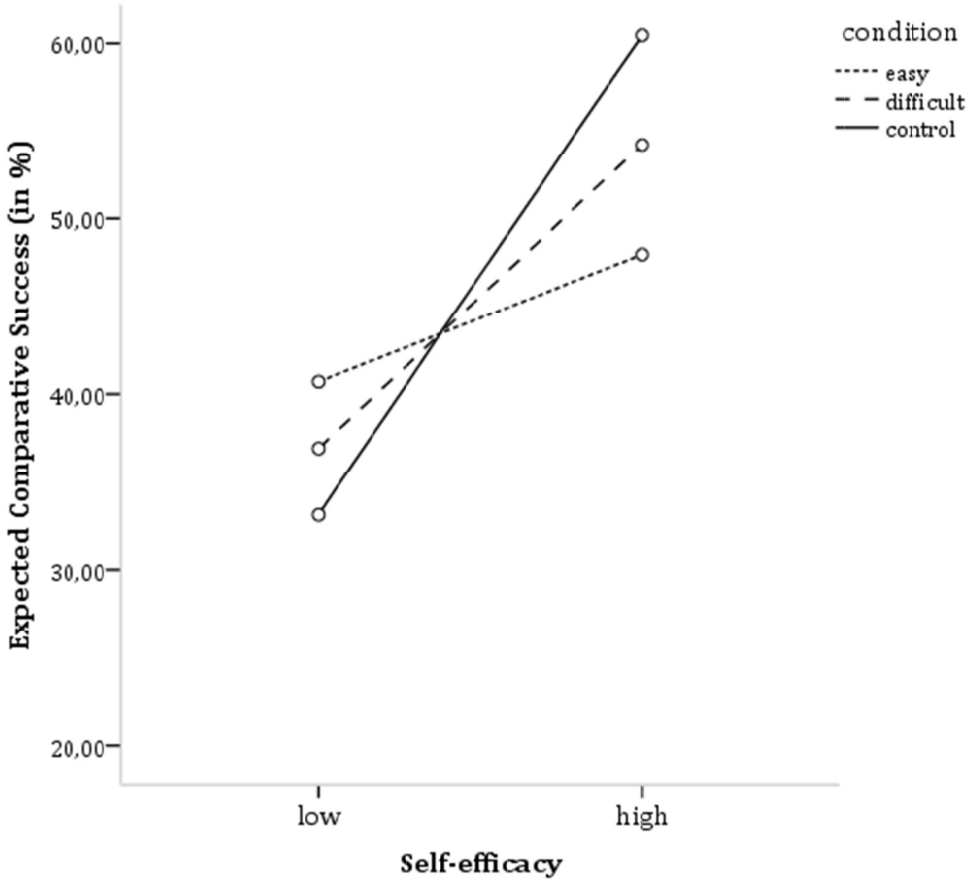

Figure 3. Study 2: Interaction-effect between perceived goal difficulty and self-efficacy on expected comparative success in percentages.

Expected absolute success. No significant main effects of self-efficacy or condition emerged, *ps* > .57. As expected, the interaction-effect was significant, $\beta = .72$, $p = .01$. Separate regression analyses showed that, similar to expected comparative

success, self-efficacy did not predict expected success in the easy condition (β = .07, p = .71). In contrast, in the difficult and control condition, higher self-efficacy was positively associated with more optimistic expectations, β = .44, p = .01, and β = .63, p < .01.

Experienced success. There were no significant main effects of self-efficacy or condition, ps < .47. A marginally significant interaction-effect emerged, β = .51, p = .09. Separate regression analyses showed that self-efficacy was only associated with comparative success in the control condition, β = .50, p = .01. In the easy and difficult condition, self-efficacy did not predict experienced success, β = .07, p = .71, and β = .19, p = .31 (see Figure 4).

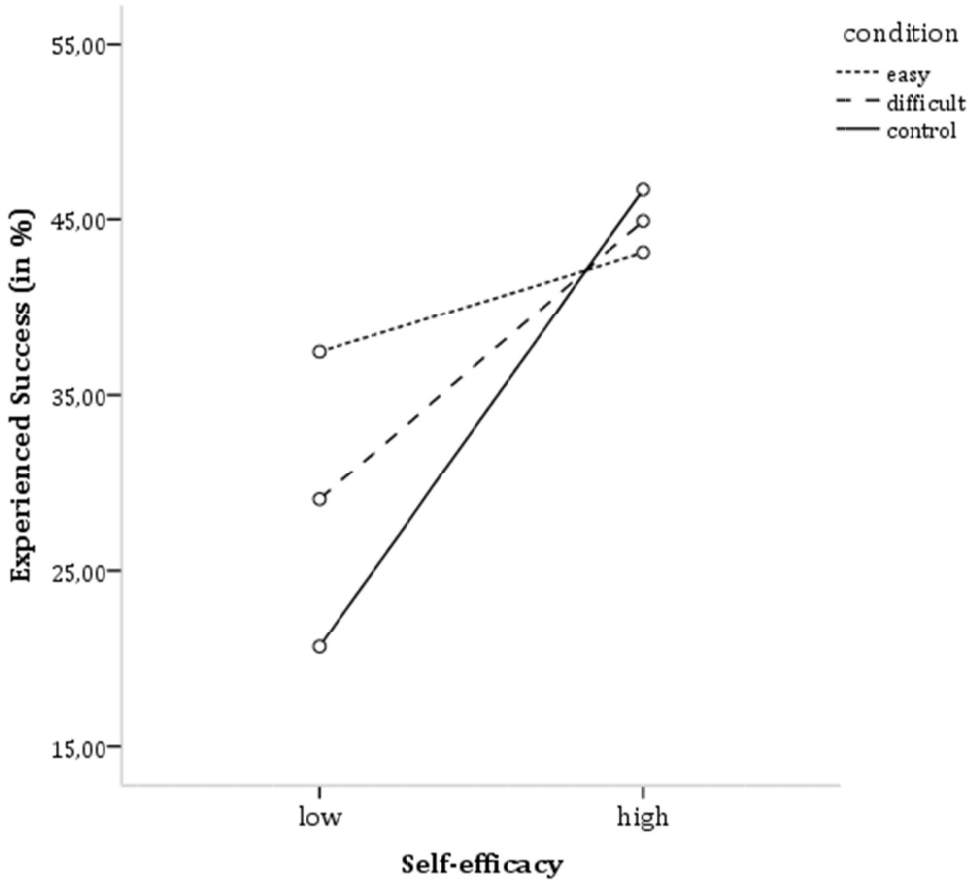

Figure 4. Study 2: Interaction-effect between perceived goal difficulty and self-efficacy on experienced success in percentages.

Unhealthy snack consumption. Prior to analysis, scores were log-transformed because of their non-normal distribution and one outlier (> 3 SD) was removed. Regression analysis showed that there were no main effects of condition nor of self-efficacy, *p*s > .22. The interaction-effect was significant, $p = .04$. Separate regression analyses showed that whereas self-efficacy was not associated with unhealthy snack consumption in the difficult ($p = .35$) and easy ($p = .95$) condition, higher self-efficacy in the control condition was associated with lower intake of unhealthy snacks in kilocalories, and thus predicted more success, $\beta = -.52$, $p < .01$ (see Figure 5). For the average amount of healthy snacks consumed per day, no main effects emerged, *p*s > .32, nor an interaction-effect, $p = .11$.

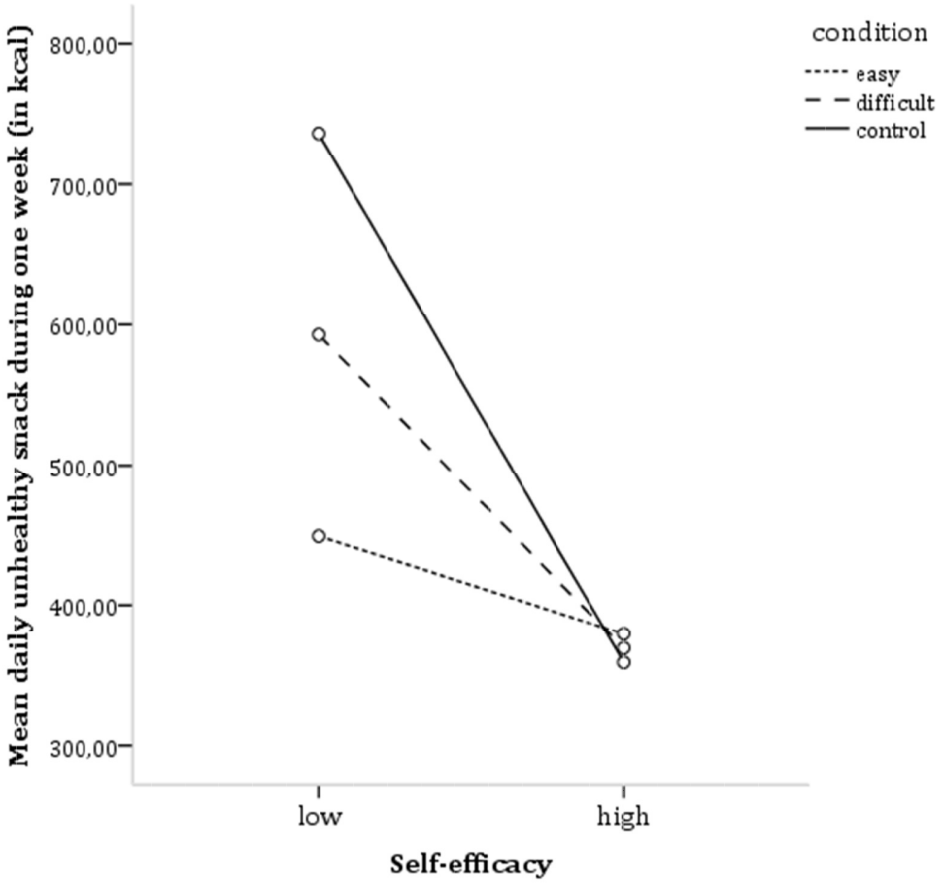

Figure 5. Study 2: Interaction-effect between perceived goal difficulty and self-efficacy on average daily unhealthy snack intake in kilocalories.

Discussion

The aim of Study 2 was to replicate findings of Study 1, and to extend these findings by using a more reliable measure for experienced success in limiting unhealthy snack intake. Findings show that although the interaction between self-efficacy and perceived goal difficulty was replicated for success expectations, this was not the case for experienced success. Unexpectedly, in the control condition, which did not receive explicit information about goal difficulty, the largest differences were found in (expected) success between high and low levels of self-efficacy, with higher levels of self-efficacy resulting in lower unhealthy snack consumption. It is noteworthy that apparently people believe by default that the goal of eating less unhealthily is difficult rather than easy, as evidenced by the similar direction of the slopes for the control and the difficult condition. Together, these results do not only reiterate the beneficial effects that high self-efficacy has on successful health goal pursuit, but also indicate that success expectations do not necessarily translate into actual success.

General Discussion

The aim of the present studies was to examine the interplay between self-beliefs and goal-beliefs in success expectations and actual goal-directed behavior in the context of unhealthy eating goals. Findings from both studies show that, as hypothesized, when the goal of diminishing unhealthy eating behavior was perceived as difficult, people with a high level of positive self-beliefs had higher success expectations than those with a low level of positive self-beliefs. For easy goals, in contrast, positive self-beliefs did not differentially influence success expectations. Although Study 1's findings indicated that goal difficulty and positive self-beliefs also interact to influence subsequent subjective experienced success in diminishing unhealthy eating behavior, Study 2 failed to replicate these findings using a more objective measure of actual success. Together, these results indicate that positive self-beliefs shield optimistic expectations in the face of a difficult and complex long-term goal, although this does not necessarily translate into actual successful goal adherence.

The consistent finding across studies that the prospect of a difficult goal preserved optimistic expectations in people with high rather than low positive self-beliefs attest to our proposition that positive self-beliefs serve as a protective factor against the downward adjustment of success expectations in the face of a difficult long-term goal. In addition, results show that a perceived difficult goal is not invariably a

source of aspiration (Zhang & Fishbach, 2010), but can have a discouraging impact on people as well. This indicates that optimistic expectations towards behavior change do not necessarily prevail even in the face of disconfirming information (Polivy & Herman, 2002; Weinstein, 1980). In a similar vein, when we view our results in the light of the literature on comparative optimism (Weinstein, 1980), it is striking that participants in our study failed to show the unrealistic optimism bias that people typically are assumed to display towards health behavior change (Polivy & Herman, 2002), i.e., people's tendency to report that they are more likely than others to experience positive events. That is, our participants on average expected their likelihood of success as roughly equal to those of similar others (no more than 55%; see Figure 1 and 2, Panel A). Our results thus indicate that optimistic expectations are 'situated' (Armor & Taylor, 1998), which means that they do not only depend on pre-existing beliefs about the self, but are also determined by contextual factors. Moreover, our results advance the novel idea that goal-beliefs, in addition to self-beliefs, can play an important role in people's expectations towards health behavior change. This is important knowledge because self-beliefs may be less amenable to change than goal-beliefs, as their most influential source is prior experience (Bandura, 2004). In line with this suggestion, health behavior change interventions have been shown to bring about limited success in changing self-beliefs (Ashford, Edmunds, & French, 2010; Williams & French, 2011). The present results indicate that even when people have a low level of positive self-beliefs, they can still be motivated to initiate health behavior change as long as they expect the goal to be easy. Our research thus calls for a shift in research attention from the focus on changing self-beliefs to identifying ways in which people with low levels of positive self-beliefs can be motivated to change.

Findings from both studies also show that the prospect of an easy goal nullified the detrimental effects that a low level of positive self-beliefs may have on expected success, as evidenced by the equally optimistic expectations of people with low and high positive self-beliefs when faced with an easy goal. These results contradict the widely held notion that easy goals have little motivational value for goal pursuit. That is, it has been proposed that, because easy goals guarantee success without having to put effort into achieving them, people do not feel motivated by easy goals, resulting in a withdrawal of effort and less subsequent success (Locke & Latham, 2002). Our results, however, suggest that the prospect of an easy goal may have a motivational function for

people with a low level of positive self-beliefs, and importantly, that goal-beliefs are sensitive to persuasive communication attempts. The knowledge that a low level of positive self-beliefs can be ameliorated by removing the daunting prospect of a difficult long-term goal can be used by health professionals to prevent people with low positive self-beliefs from failing to initiate health behavior change at all.

Unexpectedly, although Study 1 showed the expected interaction between perceived goal difficulty and positive self-beliefs on subjective experienced success after one week, this effect on subjective and actual success was not replicated in Study 2. Several explanations could account for this finding. First, it was explicitly stated to participants that the findings as presented in the article about goal difficulty, i.e., the manipulation, would be tested. This may either have lowered the persuasive value of the information about goal difficulty or elicited reactance effects, which in turn may have yielded less strong effects or effects of shorter duration than in the first study. Second, the lack of differences in unhealthy snacking behavior may be the result of a lack of statistical power. The large amount of variability between participants that is typically observed in unhealthy eating behavior makes it difficult to detect differences when power is low, as was the case in Study 2. It is nonetheless striking that when faced with a difficult goal, participants with a high level of positive self-beliefs ate on average about 200 calories less than those with low positive self-beliefs, which is not only in line with our expectations, but also may have important behavioral implications. To illustrate, it has been suggested that weight gain can be prevented by a decrease of 100 calories a day (Hill, Wyatt, Reed, & Peters, 2003).

Some limitations must be noted. First, we tested our hypotheses in a sample of young highly educated women with a healthy weight, which limits the generalizability of our findings. It is possible that the effect of perceived goal difficulty, as well as its interaction with positive self-beliefs, differ in the typically examined treatment-seeking overweight older populations. For example, overweight people may have considerably more experience with (failure in) health behavior change and may have on average lower levels of positive self-beliefs than in the current sample, which may negatively affect their responsiveness to persuasion. This suggestion should be addressed in future research. Second, we measured behavior over a relatively short period of time, which precludes conclusions about the long-term effects of goal difficulty and positive self-beliefs. It is possible that beliefs about goal difficulty are hard to maintain in the face of

real experience with goal pursuit. Future research should therefore include a longer measurement period. Third, findings should be viewed with caution as some interaction-effects between goal difficulty and positive self-beliefs were marginally significant, which is likely due to a lack of power.

Notwithstanding these limitations, the present studies have some notable strengths. First, our study is the first to examine the role of perceived goal difficulty in (expected) success towards complex, long-term goals such as health goal pursuit. Our research points out that self-beliefs and goal-beliefs are related yet independent constructs that together determine people's expectations towards goal pursuit. Second, we moved beyond correlational and cross-sectional designs typically employed in studies on health behavior change, by examining the effects of goal difficulty and positive self-beliefs in an experimental longitudinal design. The present studies therefore open up important novel avenues for future research. For example, an interesting finding is that the impact of a low level of positive self-beliefs on (expected) success in limiting unhealthy eating behavior was most detrimental in the control group, who received no explicit information about goal difficulty. In fact, our results show that among people harboring low positive self-beliefs, those who believed that goal achievement would be difficult were actually more optimistic and successful than those who lacked salient information about goal difficulty. Future research should investigate this puzzling finding.

To conclude, perceived goal difficulty may be an additional factor to take into account to increase our understanding of why some people fail to initiate health behavior change. Importantly, our research shows that changing goal-beliefs may be a viable route to keep people from giving up before they even try to initiate health behavior change. That is, by removing the daunting prospect of a difficult, complex and long-term goal, people who have little confidence in themselves can have nonetheless optimistic expectations towards goal pursuit. The conclusion that the anticipated ease of goal pursuit is beneficial to goal striving seems somewhat at odds with the notion that the anticipation of difficulties is a necessary prerequisite for successful goal pursuit. That is, a core component of many behavior change theories is that difficulties along the way should be foreseen to prepare for them in advance (e.g., Aspinwall & Taylor, 1997). However, our research suggests that, when it comes to the initiation of health behavior change, it may be better to focus on the 'can' than the 'cannot'-factors to

preserve optimistic expectations. After all, people who want to change their health behavior but lack the confidence to do so will not succeed unless they try.

Chapter 3:

Better sorry than safe:

Making a Plan B reduces effectiveness of implementation intentions in healthy eating goals

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Abstract

Although flexibility is crucial to successful goal pursuit, implementation intentions (if-then plans) seem to defy such flexibility by their focus on one goal-directed response for one specific situation. This is problematic when planned behaviors are impossible to execute *in situ* (e.g., planning to eat an apple but apples are unavailable). The present research examines whether and how planning more than one goal-directed response for the same situation ('making a Plan B') affects goal pursuit in the context of healthy eating. Study 1 revealed that making a Plan B disrupts the creation of if-then associations during plan formation. Study 2 showed that making a Plan B yields increased unhealthy food intake compared to making one or no plan, and, moreover, induces greater cognitive load during plan enactment. In conclusion, making a Plan B interferes with essential cognitive processes during different stages of planning, leading to an increased likelihood of self-regulatory failure.

Successful goal pursuit requires both flexibility and tenacity (Brandstädter & Rothermund, 2004). Flexibility is necessary to adapt behavior to the dynamic circumstances of goal pursuit, such as switching from fruitless to more fruitful courses of action (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). At the same time, goal pursuit requires tenacity to do as intended and to avoid falling prey to obstacles that interfere with goal pursuit, such as being tempted by chocolate when on a diet (Shah, Friedman, & Kruglanski, 2002). Implementation intentions, i.e., specific if-then plans (Gollwitzer, 1999), promote tenacity in goal pursuit, but their focus on one goal-directed behavior (e.g., eating an apple) to be performed in one critical situation (e.g., watching tv) seems to defy flexibility. In the present research, we aim to examine whether *planned* flexibility constitutes a viable solution to this problem. Specifically, we investigate whether and how planning more than one goal-directed response for a situation ('making a Plan B') may promote successful goal pursuit.

Implementation intentions are plans that specify when, where and how a goal will be pursued, for example "If it is Tuesday at 4 o'clock, then I will go jogging!" (Gollwitzer, 1999). Whereas goal intentions merely specify the goal one wants to attain, e.g., "I intend to go jogging!", implementation intentions make a goal-directed response ('jogging') contingent upon a situation that will be encountered in the future ('Tuesday at 4 o'clock'). An implementation intention creates a mental link between the situation and the response, such that upon encountering the situation, the response will automatically be initiated (Bayer, Achtziger, Gollwitzer, & Moskowitz, 2009). Coping-oriented implementation intentions help people persist and successfully deal with obstacles that may derail goal attainment (Gollwitzer, 1999). As such, they are particularly suitable for self-regulation goals that are susceptible to relapse into unwanted habits, such as unhealthy eating (Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011). Coping-oriented implementation intentions specify a situation that threatens goal adherence in the if-part and a coping response to deal with the goal threat in the then-part. An example is "If I am tired and feel like eating chocolate, then I will take an apple instead!". In the present article, we focus on such coping-oriented implementation intentions as they are helpful for one of the most difficult challenges in self-regulation: the maintenance of successful health behavior change (Jeffery et al., 2000).

The benefits of implementation intentions for successful behavior change are without doubt, as numerous studies have shown their effectiveness for behaviors such as exercise (Bélanger-Gravel, Godin, & Amireault, 2013) and unhealthy eating (Adriaanse et al., 2011). However, the defining feature of implementation intentions – the specification of one situation and one response – can be a double-edged sword. Although this one-on-one link ensures that goal-directed behavior will be initiated without the need for deliberation, cognitive resources or conscious intent (Bayer et al., 2009), recent evidence demonstrates that it also discourages the use of goal-relevant behaviors that are not specified in the plan (Bayuk, Janiszewski, & Leboeuf, 2012; Masicampo & Baumeister, 2012). Specifically, when people have made an implementation intention, they are unlikely to perform unplanned behaviors, even if these unplanned behaviors facilitate goal pursuit. This raises the question whether implementation intentions' effects can be maximized by planning more than one response for a situation (henceforth referred to as 'making a Plan B').

Intuitively, making a Plan B seems a viable way to promote the much needed flexibility in goal striving that one implementation intention may hamper. That is, it may be useful to plan two responses by formulating two implementation intentions, with one and the same critical situation in the if-parts, but two different responses in the then-parts. Making a Plan B thus entails that people, in addition to making one implementation intention (e.g., "If I feel like eating chocolate, then I will eat an apple"), formulate another implementation intention with the same situation specified in the if-part (e.g., "If I feel like eating chocolate, then I will distract myself!"). In that way, a response that turns out to be faulty or non-instrumental can easily be replaced by another. This is important when a planned response may (prove to) be impossible or unwise to execute *in situ* (e.g., a person plans to eat an apple, but apples are unavailable; Parks-Stamm & Gollwitzer, 2009). Indeed, theorizing (Webb, 2006) and one unpublished study (Wieber, Odenthal, & Gollwitzer, 2009; as cited in Gollwitzer, Wieber, Myers, & McCrea, 2010) suggest that planning multiple responses for one situation could be as effective as one implementation intention formulated in isolation. Whether such increased planned flexibility of responses influences goal attainment, however, is an as yet unanswered question. Below, we argue that, despite its intuitive appeal, making a plan B is more likely to harm than to boost goal attainment.

The literature advances three possible reasons why making a plan B would be counterproductive. First, the formation of multiple responses linked to one situation may prevent the creation of strong mental associations between the situation and each response; in other words, making a Plan B may 'dilute' the associative strength between the situation and each planned response (Webb, 2006). Such weakened associations may decrease the likelihood that any of the responses will be executed, as strong mental links are a prerequisite for implementation intentions' effects (Gollwitzer, 1999). A second possibility is that making a Plan B negatively affects motivation to execute the plan(s): it may be more difficult to commit to multiple plans than to one single plan, resulting in decreased commitment to one or both of the plans (Gollwitzer, 2006). Third, making a Plan B may interfere with processes during plan enactment rather than during plan formation. Gollwitzer (2006) suggests that multiple responses linked to one situation may create 'response competition'. This means that, upon encountering the situation, the two competing responses create a choice moment that interferes with the automatic enactment of planned behavior(s), and hence, hinder goal attainment. Particularly, the competition between the two responses may require valuable cognitive resources which may otherwise be devoted to plan execution itself (Webb, 2006). Having a Plan B may thus impose cognitive load and hinder the execution of (one of) the plan(s), in contrast to the swift and automatic enactment of the planned response when only one plan has been made. Thus, from a theoretical viewpoint, one situation linked to two responses is less likely to produce favorable effects than if a unique link exists between a situation and a response.

Indirect evidence for this proposition comes from two studies demonstrating that multiple implementation intentions are less beneficial to goal pursuit than one (Dalton & Spiller, 2012; Verhoeven, Adriaanse, De Ridder, De Vet, & Fennis, 2013). Examining the processes during plan formation as an explanation for multiple plans' disadvantageous effects, these studies show divergent evidence. Although one study (Verhoeven et al., 2013) points towards weakened associative links, the other study indicates that motivational factors may also play a role (Dalton & Spiller, 2012). Although these studies support the notion that multiple implementation intentions are not beneficial to goal pursuit, both examined the effects of multiple unique plans, each specifying a different situation and a different response. In the present research, we examine the as yet untested hypothesis that planning multiple responses to *one and the*

same situation yields disadvantageous effects compared to planning one response for one situation. In addition, it is unknown which explanation may account for these disadvantageous effects: the aforementioned studies show contradictory evidence in this regard and the proposed third explanation – the interference with processes during plan enactment – has never been examined. We therefore aimed to examine these different explanations in the present research.

To summarize, we aimed to a) test the hypothesis that making a Plan B yields less beneficial effects on goal pursuit compared to a 'conventional' single implementation intention, and b) investigate its underlying mechanism(s). In Study 1, we examined the cognitive and motivational effects of making a Plan B during plan formation. Specifically, we examined whether a Plan B hinders the creation of strong mental associations between the situation and response(s) and/or decreases commitment to the plan(s). In Study 2, we examined the behavioral effects of making a Plan B, that is, whether a Plan B results in less successful goal pursuit than one or no plan. In addition, we tested the effects of making a Plan B during plan enactment, i.e., whether a Plan B induces more cognitive load in the enactment phase than making one plan. In both studies, we focus on eating behavior as it constitutes a typical self-regulatory behavior that many people not only intend to change, but also struggle with on a daily basis. With these studies, we address two important gaps in the literature. First, no research to date has examined the effects of multiple coping responses for *one and the same situation* on goal pursuit. Second, it is unknown why making a Plan B may hinder goal pursuit: current evidence is mixed and incomplete. These gaps are important to address because goal-threatening situations during goal pursuit are not only omnipresent, but also uncertain and difficult to predict (Fujita & Roberts, 2010), which increases the likelihood that a planned response goes awry. In such cases, it is important to know whether to better be safe than sorry, or to better be sorry than safe.

Study 1

In Study 1, we investigated whether specifying two responses for one situation ('making a Plan B') affects the cognitive association between the if-part and the then-part(s). A lexical decision task was employed to measure the associative strength between the situation and the planned response(s). We expected that making a Plan B would lead to weaker associations between the situation and both planned responses, as evidenced by slower reaction times to the planned response(s) after presentation of the situation,

compared to formulating a single plan. In addition, we examined the alternative explanation that making a Plan B would decrease commitment to one or both of the plans.

Method

Participants. Only females were included as they differ considerably from men in their (attitudes towards) eating behavior (Wardle et al., 2004). In total, 171 females participated in the experiment. After excluding 8 participants because they were outliers on reaction times to one of the two critical trials in the primed lexical decision task (*SD* > 3; *n* = 5), who indicated to be dyslectic (*n* = 1), or whose percentage correct answers in the lexical decision task deviated substantially from the sample mean (*SD* > 3; *n* = 2), the final sample consisted of 163 participants with a mean age of 20.58 (*SD* = 2.80) and a mean BMI of 21.59 (*SD* = 2.94).

Procedure and design. The experiment had a 2 (Condition: Strategy A vs. Strategy A and B) X 2 (Prime: Situation Prime vs. Neutral Prime) X 2 (Order of Strategy Presentation in LDT: A first vs. B first; see below) between-subjects design. Whereas half of the participants formulated one implementation intention (situation – Strategy A), the other half was asked to formulate an additional implementation intention specifying an alternative strategy for the same situation (situation – Strategy A and situation – Strategy B). Then, to measure the association strength between the situation and the strategy(ies), a primed lexical decision task was employed to measure the accessibility of strategy A and B after a neutral cue prime (Neutral Prime) or the critical situation prime (Situation Prime). Next, control variables were measured to rule out alternative explanations (see below). Lastly, participants were probed for suspicion, debriefed, thanked, and reimbursed for their participation. All tasks were completed on a desktop computer.

Materials.

Pilot study. As part of a larger data collection, pilot data were collected to assess the most frequently named situation in which female students consumed an unhealthy snack. Female participants (*N* = 289) with a mean age of 21.15 years (*SD* = 2.87) and a mean BMI of 22.02 (*SD* = 3.25) were asked to generate the situation in which they typically took an unhealthy snack. In addition, they indicated which strategy was most effective for them to resist the temptation in that situation. Results show that the most frequently named situation was 'boredom' (*N* = 59; 20.4 %), and as research

corroborates that boredom is an important trigger for eating unhealthily (Koball, Meers, Storfer-Isser, Dornoff, & Musher-Eizenman, 2012), we chose 'boredom' as the critical situation (the if-part of the implementation intention). Regarding the most effective strategy for resisting temptation, results show that participants who named 'boredom' as the critical cue, the majority (*N* = 35; 59.3 %) indicated that 'distraction' was the most effective strategy, followed by 'replacement' (*N* = 22; 37.3 %). Consequently, 'distraction' was used as the first strategy, and 'replacement' as the second strategy for the then-part(s) of the implementation intention(s).

Implementation intention formulation. Participants first read that a survey had demonstrated that 'boredom' is the most typical situation in which female students consume unhealthy snacks, and that 'distraction' was the most frequently used strategy to resist temptation when bored. All participants then formulated the intention "I intend to reduce my unhealthy snack intake the coming week!" by repeating it at least three times, after which they formulated implementation intentions. Specifically, they formulated "If I am in the situation boredom and I feel like having a snack, then I will use the strategy distraction!". To ensure sufficient encoding of the plan, participants were instructed to repeat the statement in their mind a few times, envision themselves acting out their plan, and repeat the plan by typing it out. Next, they indicated how motivated they were to act out their plan on a 1*(not at all)*-5*(very much)* scale. Whereas half of the participants, the A condition, proceeded to the primed lexical decision task (see below), the other half, the AB condition, received instructions to formulate an additional implementation intention for the same situation ('boredom'). They read that "Sometimes you cannot execute your strategy in a situation. In such cases, it can be convenient to have another strategy at your disposal. We therefore would like to ask you to make a second plan". Referring again to the results of the large survey indicating that 'replacement' is an additional widely used strategy, participants were asked to formulate the plan "If I am in the situation boredom and I feel like having a snack, then I will use the strategy replacement!". For this second plan, sufficient encoding was also ensured, and motivation for the second plan was assessed similarly as for the first plan.

Lexical decision task (LDT). For the LDT, participants were instructed that they should press a left or a right key on a response box (Cedrus RB-530) to indicate as accurately and quickly as possible if a presented word was an existing word or not (corresponding keys for 'word' and 'non-word' were counterbalanced across

participants). A practice task of 8 trials was employed before proceeding to the actual LDT.

Each trial in the LDT started with a fixation cross (1000 ms), after which the prime was presented for 50 ms. Next, a backward mask consisting of a string of x's was presented for 500 ms, and then the target (word or nonword) appeared until participants responded by pressing a left or right key on the response box. After responding, a blank intertrial screen appeared for 2000 ms.

The LDT constituted 80 trials in total, which consisted of 40 trials presented twice in fixed pre-randomized order in two sequential identical blocks. Primes and targets were matched on word length and frequency in the Dutch language and all targets were verbs to match the nature of the critical targets (the Dutch verbs 'afleiden' and 'vervangen'). Targets included the two critical targets ('distraction' and 'replacement'), 18 neutral words (e.g., 'discover') and 20 pronounceable non-words (e.g., 'omstugen'). Primes included the critical situation 'boredom' (only in the Situation Prime Condition) or one of nine irrelevant words, resulting in each prime being presented four times. To ensure that reaction times were not attributable to the order in which the critical targets were presented, half of participants were presented with Strategy A before Strategy B and the other half vice versa.

Control variables. To rule out alternative explanations, we measured intention, habit strength and need for closure. The *intention* to reduce unhealthy snacking was measured twice by 4 items ("I intend/plan/want/expect to reduce my unhealthy snack intake the coming time"); once before the manipulation ($\alpha = .90$) and once after the LDT ($\alpha = .92$). The *habit strength* of consuming unhealthy snacks in the situation 'boredom' was measured by the 12-item Self-Report Habit Index (Verplanken & Orbell, 2003). Each item started with "The consumption of unhealthy snacks in the situation 'boredom' is something…" followed by, e.g., "…that is part of my routine" ($\alpha = .89$). *Need for closure* was measured by a brief 15-item version of the Need for Closure Scale (Kruglanski, Webster, & Klem, 1993; Roets & Van Hiel, 2011). Example: "I don't like situations that are uncertain" ($\alpha = .83$). Need for closure reflects preference for predictability and being uncomfortable with ambiguity, and may therefore influence potential effects of making a Plan B.

Strategy evaluations. To measure participants' evaluations of the presented strategies to resist unhealthy snacks, three items assessed a) participants' use of the

strategy, ranging from 1*(never)* to 7*(always)*; b) the extent to which they found the strategy effective; and c) the extent to which they found the strategy effective in the situation 'boredom', ranging from 1*(totally disagree)* to 7*(totally agree)*. Evaluations were assessed for the two strategies presented in the experiment, 'distraction' and 'replacement', as well as two filler strategies ('refuse' and 'ignore').

Results

Descriptives and Randomization Check. On average, participants had a moderate to high intention to consume less unhealthy snacks (M = 4.73, SD= 1.44) and a moderate habit strength to eat unhealthy snacks in the situation 'boredom' (M = 3.89, SD = 1.21). To check whether randomization was successful, separate ANOVAs were performed and showed that the eight conditions did not differ in intention, age, habit strength, and need for closure (all ps > .31), but there were differences in BMI, $F(7,155) = 2.15$, $p = .04$. BMI was therefore included as covariate in all subsequent analyses.

Main Analyses.

Reaction times to Strategy A. Before analysis, incorrect responses on the LDT were set to missing. As mean reaction times (RTs) were not normally distributed, RTs were natural log transformed. To facilitate interpretation, means and standard deviations are presented for the non-log transformed data. An ANCOVA was performed for the RTs on the target 'distraction' (Strategy A) with the three between-subjects variables (Condition, Prime, Order of Strategy Presentation) as factors and BMI as a covariate. Repeated exposure to words facilitates subsequent lexical decisions and word naming performance to that word ('repetition priming effect'; Forster & Davis, 1984). When a stimulus (pair) is presented, it is also primed, making later reaction times to a repetitively presented stimulus (pair) less reliable than the first ones. We therefore analyzed RTs for Block 1 only[1]. The ANCOVA showed a significant interaction effect between Condition and Prime, $F(1,150) = 4.54$, $p = .04$, $p\eta^2 = .03$ (see Figure 1).

Within the Situation Prime condition, the A condition reacted faster to the target 'distraction' (M = 558.75, SD = 190.26) than the AB condition (M = 655.53, SD = 190.50), $p = .07$. In contrast, within the Neutral Prime condition, RTs did not differ between the A condition (M = 610.42, SD = 189.52) and AB condition (M = 563.90, SD = 189.34), p = .26, indicating that the difference between plan conditions was not due to mere accessibility of the strategy itself, but rather of the association between the critical situation and the strategy. No other effects were significant, all ps > .21. Thus, as

expected, making a Plan B results in a weaker situation-Strategy A association compared to making one implementation intention.

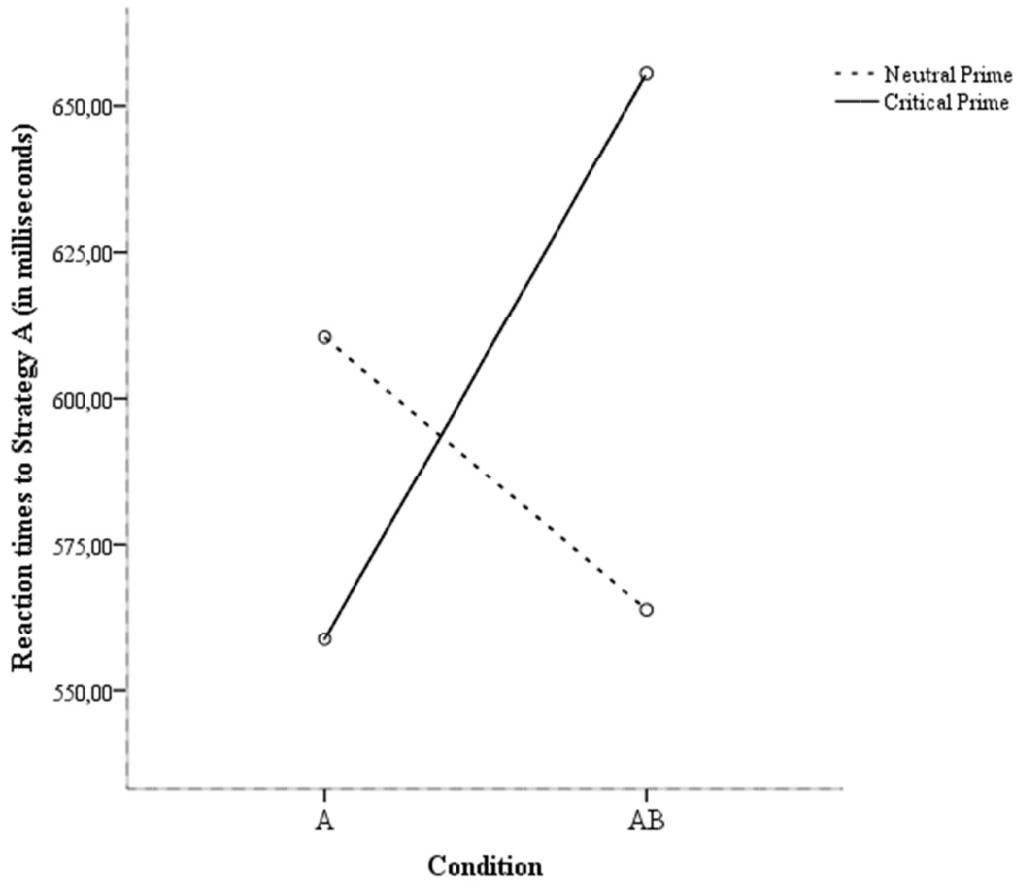

Figure 1. Study 1: Reaction times on Block 1 (in milliseconds) to Strategy A ('distraction') by condition.

Reaction times to Strategy B. The same ANCOVA was performed for the RTs of the target 'replacement' (Strategy B) as for Strategy A[1], which showed a significant interaction effect between Condition and Prime, $F(1,152) = 6.25$, $p = .01$, $p\eta^2 = .04$ (see Figure 2). In the Situation Prime condition, no differences emerged between the A condition ($M = 575.60$, $SD = 156.99$) and the AB condition ($M = 613.00$, $SD = 156.85$), $p = .27$. In the Neutral Prime condition, the AB condition reacted faster ($M = 526.63$, $SD = 155.57$) to Strategy B than the A condition ($M = 609.59$, $SD = 155.64$), $p = .02$. This can be explained by the fact that the AB condition, in contrast to the A condition, was familiar with Strategy B and therefore required less time to process the word.

Importantly, the lack of differences between the A and AB condition on Strategy B when preceded by the critical situation indicates that the situation and Strategy B were not more strongly associated in the AB than the A condition. No other effects were significant, all *ps* > .14.

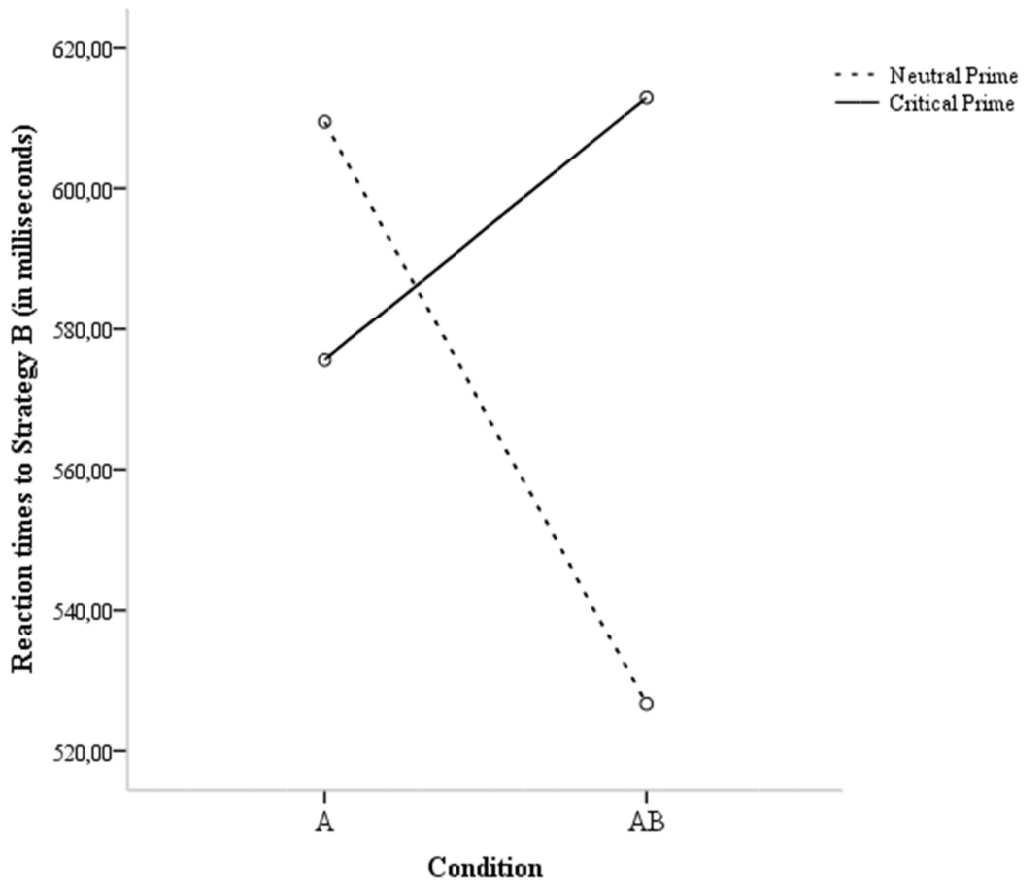

Figure 2. Study 1: Reaction times on Block 1 (in ms) to Strategy B ('replacement') by condition.

Motivational factors. A repeated measures ANOVA showed that although all participants' intention increased from T0 (M = 4.73, SD = 1.43) to T1 (M = 4.98, SD = 1.30), $F(1,160) = 4.09$, $p = .05$, this change in intention did not differ between the A and AB condition, $p = .93$. In addition, an ANOVA demonstrated that the A condition (M = 5.01; SD = 1.43) and the AB condition (M = 5.15; SD = 1.25) were equally motivated to execute their plan(s), $p = .50$[2]. These results indicate that motivational factors cannot account for the differences between the A and AB condition in association strength. To examine whether RTs to the strategies were influenced by pre-existing attitudes towards the strategies, correlations were computed. In both the A and AB condition, none of the strategy evaluations were correlated with reaction times (all rs < .22, all ps > .12; means and standard deviations are available upon request).

Discussion

Study 1 demonstrated that making a Plan B decreases the association strength between the situation and Strategy A as compared to specifying only one implementation intention. Notably, this decreased association strength is not compensated by increased strength between the situation and Strategy B. If that would have been the case – suggesting the execution of Strategy B rather than Strategy A – it would not necessarily be disadvantageous to specify an additional strategy: people could then still succeed in acting in line with their goal. The results therefore suggest that when making a Plan B, people are likely to refrain from executing either planned response. Importantly, making a Plan B did not influence intention or plan(s) commitment differently than formulating one implementation intention, suggesting that motivational factors do not play a role in the negative effects of making a Plan B.

In Study 2, we address three shortcomings of the present study. First, participants in Study 2 were able to choose their own coping response for their plan, rather than adopting an experimenter-given one. Second, the effects of making a Plan B were measured on actual behavior. Third, a control group was included to examine the effects of making a Plan B compared to mere goal intentions as well as to a single implementation intention.

Study 2

The first aim of Study 2 was to test the hypothesis that making a Plan B would be less beneficial for goal pursuit than making one plan or no plan at all, as assessed by actual behavior within the critical situation. As the assessment of behavior was done in a controlled setting, the critical situation had to be standardized for all participants. Therefore, we chose 'seeing chocolate' as the situation that participants had to plan for (in the planning conditions). We chose 'reducing chocolate intake' as the overarching goal, as chocolate is a favorite snack among many women that is both tempting and goal-threatening (Rozin, Levine, & Stoess, 1991). Our second aim was to examine whether making a Plan B would yield more cognitive load than making one plan during different stages of planning, which may explain the expected disadvantageous effects of making a Plan B. We therefore administered a Stroop task (Jostmann & Koole, 2007) twice: once after plan formation and once after plan enactment.

Method

Participants. In total, 107 females participated in the first part of the experiment, but 12 failed to return for the second part. The final sample consisted of 95 participants with a mean age of 20.56 (SD = 2.23) and a mean BMI of 21.39 (SD = 2.49).

Procedure and design. The experiment had 3 conditions (Condition: A vs. AB vs. Control group). The study, presented as an experiment about the influence of situational context on the ability to concentrate, consisted of two parts on two consecutive days. The design and cover story were chosen to minimize participants' suspicion of the true purpose of the study.

Day 1. Upon arrival at the laboratory, participants were told that, and explained why, they would perform a concentration task in two different rooms on two consecutive days. After providing informed consent, participants were then seated in front of a computer. Before they started the concentration task, the experimenter asked if they would be willing to fill out a short questionnaire for a colleague (scripted), which constituted the manipulation (see 'implementation intention formulation'). Afterwards, participants performed a modified Stroop task to measure cognitive load. It is important to note that the experimenter was blind to condition: all questionnaires were printed out before the experiment and put in a stack in random order.

Day 2. On the second day, participants were informed that we were also interested in the influence of relaxation on the ability to concentrate and therefore, they

would first be allowed to relax for ten minutes before performing the concentration task again (scripted). The participants were then taken to a room different from the previous day in which stood a relaxation chair, a coffee table with magazines and bowls with grapes and M&Ms. The experimenter explained the purpose of the chair and the food (to help participants relax; scripted). The experimenter then left and kept track of the time with a stopwatch. To check whether participants adhered to instructions, participants were filmed via the built-in camera of the laptop, for which they consented both before and after the experiment. After ten minutes, the experimenter started the Stroop task on the laptop, and took the bowls with food and the magazines from the kitchen. The bowls were weighed to assess food intake. After the Stroop task, participants were asked about their strategy use during relaxation (see below), presented among filler items about their ability to concentrate, and probed for suspicion. No participant guessed the true purpose of the study. Lastly, participants were debriefed, thanked, and reimbursed for their participation.

Materials.

Implementation intention formulation (Day 1). The questionnaire was ostensibly about New Year's resolutions to reduce unhealthy snack intake and the influence of plans on motivation. First, participants indicated how motivated they were to reduce their unhealthy snack intake, their average intake of various healthy and unhealthy snacks in a week (including chocolate and grapes, which were used for the assessment of food intake at Day 2), how much they liked these snacks, and how motivated they were to reduce their intake of the unhealthy snacks. All items were measured on a 7-point scale ranging from 1*(not at all)* to 7 *(very much)*.

Then, participants were informed that we were interested in the extent to which making a plan about chocolate reduction would affect motivation. All participants formulated the intention to reduce chocolate intake the upcoming time. While the control condition merely repeated this intention by writing it down, the other two conditions (the A and AB condition) formulated one (two) implementation intention(s) to help them achieve their goal. Specifically, they formulated the plan "If I see chocolate and I feel like having a snack, then I will use the strategy [self-chosen strategy]!". Participants chose their strategy from a list of four strategies: putting it out of sight, replacement, distraction, or exerting willpower. Whereas the A condition proceeded to the final questions about motivation, the AB condition formulated an additional

implementation intention for the same critical situation ('seeing chocolate'). Instructions for the AB condition were the same as in Study 1, except that participants formulated "If I see chocolate and I feel like having a snack, then I will use the strategy [another self-chosen strategy]!" (also chosen from the listed strategies above). Sufficient encoding of the plan(s) was ensured by repeating and envisioning acting out the plan (see Study 1).

Lastly, in addition to age, weight and height, all participants were asked to indicate on 7-point scales their a) motivation to reduce their chocolate intake, b) self-efficacy towards chocolate reduction, c) intention to reduce their chocolate intake, d) motivation to execute their plan(s). These questions were asked to make the cover story believable (i.e., the influence of plans on motivation), and they were included in the randomization check.

Modified Stroop task (Day 1 and 2). A simplified Stroop-color-naming task was used to assess cognitive load (Jostmann & Koole, 2007). Participants were presented with strings of colored letters and were asked to respond to the font color of the letters and ignore the meaning of the word. Letter strings represented a color word (*blue* or *red*) or a series of Xs (*XXXX*), which were displayed in red or blue font color. If the words were presented in blue font color, participants were asked to press the *6* key on the numeric pad of the keyboard; if the words were presented in red font color, the *A* key had to be pressed. Participants were instructed to keep their index fingers on the keys throughout the task, and to respond as fast and accurately as possible. A practice task of 8 trials were presented before the actual task (only on Day 1).

The task consisted of 60 trials presented in random order: 20 congruent trials (*red* in red font color or *blue* in blue font color), 20 neutral trials (*XXXX* in red or blue font color), and 20 incongruent trials (*red* in blue font color or *blue* in red font color). Each trial started with a fixation asterisk for 1000 ms, followed by the presentation of a colored letter string until response, followed upon response by a blank screen for 2000 ms. The stimuli were presented in the center of the screen of a desktop computer (Day 1) or a laptop (Day 2).

Measured food intake (Day 2). Participants were presented with two bowls of food during relaxation: one with grapes and one with M&Ms. Unbeknownst to participants, the bowls were weighed by the experimenter before and after the

relaxation task to assess consumption of chocolate (M&Ms) and the healthy alternative (grapes).

Self-reported strategy use (Day 2). For each of the four strategies as presented to the A and AB condition the previous day (putting it out of sight, replacement, distraction, and willpower), participants indicated the extent to which they used each of them during the relaxation task on 7-point scales.

Control variables. To ensure that potential food intake was not due to experimenter demand, participants were asked to what extent they felt free to take the available food on a 7-point scale, embedded among a similar item about reading the magazines. Also, to rule out alternative explanations, participants were asked whether they exerted effort to resist the M&Ms (*self-reported effort*), to what extent they felt like having a snack (*craving*), and to what extent they found the M&Ms tempting during relaxation (*temptation*) on 7-point scales.

Results

Descriptives and Randomization Check. On average, participants had a moderate to high motivation to reduce unhealthy snack intake (M = 4.53, SD = 1.30), scored high on liking of chocolate (M = 5.89, SD = 1.43), and moderate to high on liking of grapes (M = 5.39, SD = 1.42). As a randomization check, separate ANOVAs showed that conditions did not differ at baseline motivation to reduce unhealthy snack intake, baseline intake of chocolate and grapes, liking of chocolate and grapes, motivation to reduce chocolate intake, evaluation of grapes as good alternative for unhealthy snacks, age, and BMI (all $ps > .13$). In addition, separate ANOVAs were performed to examine whether the manipulation yielded differences between conditions in motivation to reduce chocolate intake, self-efficacy towards chocolate reduction, intention to reduce chocolate intake and motivation to execute their plan(s). No differences between conditions emerged (all $ps > .19$)[2].

Chosen strategy. A Chi-square test was performed to examine whether the A and AB condition differed in their chosen strategy for their implementation intention(s). The most frequently chosen (first) strategy was 'replacement' for both conditions: 70.6 % (N = 24) of the A condition and 66.7 % (N = 20) of the AB condition. The strategies 'out of sight', 'distraction' and 'willpower' were equally frequently chosen by each condition (between 6.7 % and 13.3 %). The choice for the strategies did not differ by condition, $\chi^2(3) = .93$, $p = .93$. In the AB condition, the most frequently chosen *second*

strategies were 'distraction' (36.7 %, N = 11) and 'out of sight' (30.0 %, N = 9); the other strategies were chosen much less frequently (10 % and 16.7 %; two participants (6.7 %) came up with their own second strategy).

Analyses of behavior.

Measured unhealthy food intake. The non-forced eating setting allowed us to analyze the occurrence of eating per se (yes/no), and the amount consumed for those who ate (Taut, Brenner, & Baban, 2012). To analyze differences between conditions in whether participants ate the food (yes/no), a Chi-Square test was performed, and showed that the number of participants that ate any M&Ms did not differ by condition, $\chi^2(2) = .21$, $p = .90$ (A: 64.7 % vs. AB: 70.0 % vs. Control: 67.7 %).

To analyze differences between conditions in the amount of food intake for participants who ate any M&Ms (N = 64), change scores were computed by subtracting the weight after relaxation from the weight before. Kilocalories were computed by multiplying grams with kcal per gram. In addition, scores were natural log-transformed as data were not normally distributed; to facilitate interpretation, means and standard deviations are reported of the non-transformed data. An ANOVA showed a significant main effect of condition, $F(2,61) = 3.29$, $p = .04$, $p\eta^2 = .10$. Post-hoc analyses showed that whereas participants in the A condition and the Control condition ate an equal amount of calories in M&Ms, $p = .76$, participants in the AB condition ate significantly more than both the A condition, $p = .02$, and the Control condition, $p = .05$ (see Table 1).

Measured healthy food intake. A Chi-Square test was performed showing that the number of participants that ate any grapes did not differ by condition, $\chi^2(2) = .91$, $p = .64$ (A: 76.5 % vs. AB: 66.7 % vs. Control: 67.7 %). Consumption of grapes (in grams) was log-transformed to correct for a non-normal distribution. An ANOVA showed that no differences in conditions emerged when participants that ate any grapes were analyzed (N = 69), $F(2,66) = .42$, $p = .65$ (see Table 1). Also, there were no differences between the two planning conditions when only those who chose 'taking a healthy alternative' as strategy were analyzed (N = 34), $F(1,28) = .42$, $p = .42$[4].

Table 1. *Study 2: Means and Standard Deviations of Unhealthy and Healthy Food Intake by Condition*

	A-Condition		AB-Condition		Control Condition	
	M	*SD*	*M*	*SD*	*M*	*SD*
Measured intake of M&Ms (kcal)	59.81[a]	87.78	97.73[b]	98.19	60.76[a]	73.04
Measured intake of grapes (grams)	41.12	35.84	34.80	26.49	35.88	45.56

Note. Means with different subscripts differ significantly at $p < .05$. Values for change in food intake refer to those who ate at least some of the foods.

Alternative explanations for unhealthy food intake. To ensure that factors other than the manipulation did not explain M&Ms intake between conditions when only the participants who ate M&Ms were analyzed, separate ANOVAs were performed. No differences emerged between conditions in liking of chocolate, motivation to reduce chocolate intake, self-efficacy and intention to reduce chocolate intake, and plan(s) motivation, all *ps* > .21. In addition, separate ANOVAs showed that conditions did not differ in the extent to which they felt free to take the food, how tempting they found the M&Ms, their craving, and their exerted effort to resist the M&Ms, all *ps* > .71.

Alternative explanations for healthy food intake. To ensure that factors other than the manipulation did not influence grape intake between conditions, separate ANOVAs were performed on the participants who ate grapes. No differences emerged between conditions in liking of grapes, and plan(s) motivation, *ps* > .41.

Self-reported strategy use. Separate ANOVAs were conducted to analyze the self-reported use of the four strategies (putting it out of sight, replacement, distraction, and willpower). For all four strategies, no differences between conditions emerged, all *ps* > .23.

Analyses of cognitive load. Before analysis, incorrect responses (2.3 % on both days), responses that were extremely fast (< 300 ms; 2.9 % on Day 1 and 1.2 % on Day 2; see Jostmann & Koole, 2007) were set to missing. Participants who responded extremely slow on the means of neutral, congruent, or incongruent trials (> 2.5 SD) were excluded from analysis ($N_{Day1} = 1$, $N_{Day2} = 4$; 5.4 % of participants). In addition, due

to a technical error[5], data from 23 participants were unusable and thus excluded from analysis. Consequently, results for Stroop interference are reported for 72 participants. Reaction times (RTs) were logtransformed; results are reported for non-transformed RTs.

To assess whether overall Stroop interference (faster color-naming of neutral than incongruent stimuli) and facilitation (faster color-naming of congruent than neutral stimuli) were present, several paired *t*-tests were conducted. For Day 1, average RTs on neutral trials (M = 463.83, SD = 89.76) were faster than RTs on incongruent trials (M = 494.46, SD = 111.67), $t(65) = -3.85$, $p < .001$. Also, RTs on congruent trials were faster (M = 449.62, SD = 79.05) than RTs on neutral trials, $t(65) = -2.57$, $p = .01$. For Day 2, RTs on neutral trials were faster (M = 460.27, SD = 72.80) than on incongruent trials (M = 476.12, SD = 93.46), $t(66) = -2.61$, $p = .01$. However, RTs on congruent trials (M = 457.39, SD = 77.34) were as fast as those on neutral trials, $t(66) = -1.03$, $p = .31$. Thus, although there was interference on both days, facilitation was only present on Day 1.

Stroop Interference Scores (SIS) were computed by subtracting average responses on congruent trials from average responses on incongruent trials (Ståhl, van Laar, & Ellemers, 2012). Higher scores on this measure indicate more Stroop interference and thus more cognitive load. A paired samples *t*-test revealed that on Day 1, there was more Stroop interference (M = 44.84, SD = 62.21) than on Day 2 (M = 18.79, SD = 44.58), $t(65) = 3.60$, $p < .01$, indicating a learning effect. As SIS on Day 1 and Day 2 were significantly correlated (r = .34**), we included SIS of Day 1 as a covariate for the analyses of Stroop interference on Day 2.

An ANOVA showed that condition had no significant effect on Stroop interference on Day 1, $F(2,63) = 1.66$, $p = .20$. This suggests that making one, two or no plans is equally cognitively demanding. On Day 2, in contrast, an ANCOVA showed that condition had a significant effect on Stroop interference, $F(2,62) = 3.16$, $p = .05$, $p\eta^2 = .09$. Whereas the A condition showed almost no Stroop interference (M = 1.27, SD = 38.80), the AB condition (M = 22.15, SD = 39.87) and Control condition (M = 33.91, SD = 49.73) did. Pairwise comparisons showed that whereas the A condition experienced less cognitive load than both the AB and Control conditions, $p = .05$ and $p = .03$, the AB and Control condition did not differ, $p = .81$ (see Figure 3). These findings indicate that at the plan

enactment stage, the A condition experienced less cognitive load than the AB and Control condition.

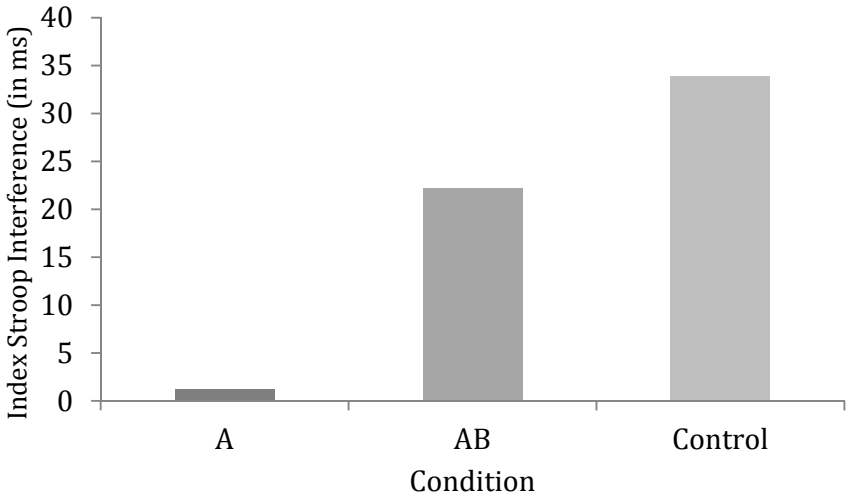

Figure 3. Study 2: Differences in Stroop interference (in milliseconds) between conditions on Day 2.

Discussion

The first aim of Study 2 was to examine the effects of making a Plan B on actual behavior. Findings showed that people who specified two implementation intentions with two strategies to resist chocolate in one situation ate more chocolate than those who specified one implementation intention and those who merely formulated goal intentions. The intake of healthy food did not differ between conditions, even for those who specifically planned to do so. Unexpectedly, the percentage of participants that refrained from eating any of the unhealthy food was equal among conditions, and no differences emerged in unhealthy food intake between participants who formulated one implementation intention and those in the control condition. The second aim was to elucidate to what extent cognitive load could provide an additional explanation for the detrimental effects of making a Plan B. Results demonstrate that making a Plan B led to more cognitive load than formulating one plan during the plan enactment stage, whereas no differences in cognitive load emerged during the plan formation stage. Similar to Study 1, motivational factors did not differ between conditions. These findings indicate not only that making a Plan B is less beneficial to goal pursuit than formulating one implementation intention, but also that that cognitive load during the plan enactment stage may play a role in the negative effects of making a Plan B.

General Discussion

As flexibility during goal pursuit is generally considered beneficial and specific plans are often criticized for their over-emphasis on tenacity at the cost of flexibility, the first aim of the present research was to investigate whether increased *planned* flexibility would facilitate successful goal striving in the context of self-regulatory behavior. Findings reveal that, as hypothesized, specifying two coping strategies for one critical situation ('making a Plan B') is less beneficial to goal pursuit than formulating one implementation intention The second aim was to examine the underlying mechanisms of the hypothesized negative effects of making a Plan B. Results demonstrate that it interferes with crucial cognitive processes during both plan formation (creation of strong associative links) and plan enactment (the absence of cognitive load). Together, these results show that, despite its intuitive appeal, planned flexibility may come at the cost of successful goal pursuit.

Our hypothesis that making a Plan B is less beneficial to goal pursuit than formulating one implementation intention received consistent support in our studies. Study 1 showed that making a Plan B undermines the creation of strong mental links between a situation and either of the planned goal-directed response(s). As strong links are essential for the effectiveness of implementation intentions (Gollwitzer, 1999), these results show that making a Plan B has negative implications for implementation intentions' effects on a cognitive level. Study 2 then demonstrated the negative consequences of making a Plan B for actual behavior: those who planned two responses were less able to resist temptation in a goal-threatening situation than those who planned one response and those who merely formulated a goal intention. Importantly, these findings could not be accounted for by differences in goal intention, commitment, and plan motivation (Study 1 and 2), and in self-reported effort to resist, and strength of, the goal-threatening temptation (Study 2).

Findings from both studies show that making a Plan B is disadvantageous because it interferes with cognitive processes during different stages of planning. First, during the plan formation stage, making a Plan B hinders the creation of strong associative links between the situation and both responses. If for at least one of the responses a facilitative association with the situation would have been created, then people would still have been able to automatically activate that response when encountering the situation. However, the absence of facilitative associations suggests

that neither of the responses will be activated upon encountering the critical situation. Hence, the likelihood of executing either response would be just as large as when no plans would have been made. The lack of facilitated mental activation of a coping response was also apparent during the plan enactment stage, where we found that having a Plan B costs valuable cognitive resources: whereas participants who made a single implementation intention experienced very little cognitive load after dealing with the critical situation, for those who made a plan B or formulated mere goal intentions the situation was apparently more cognitively taxing, as evidenced by greater Stroop interference. Possibly, making a Plan B invokes the need to scrutinize the suitability of the planned coping response *in situ*, leaving ample opportunity for internal and external factors to interfere with the execution of any planned response (Gollwitzer, 1999). The finding that having formulated a Plan B and mere goal intentions both imposed equal cognitive load suggests that a Plan B may be as cognitively taxing as presumably trying to come up spontaneously with a strategy to act upon intentions. Importantly, the very act of planning multiple goal-directed responses does not impose additional cognitive demands, as evidenced by the lack of differences in cognitive load after plan formation between planning one and two responses.

Two unexpected findings emerged from Study 2. First, the percentage that did not eat any of the unhealthy food – supposedly the pinnacle of successful self-regulation – did not differ between those who made two, one or no plan(s). Thus, making one, two, or no plan(s) may not differentially influence the number of people that eat *per se*, and hence may be equally effective in successful goal pursuit. However, it should be noted that the overarching goal was to reduce, rather than refrain from, unhealthy food intake. The fact that roughly two-thirds of participants ate at least some of the chocolate indicates that the overarching goal to reduce unhealthy food was in general not mistaken for the goal to avoid eating unhealthy food at all. In line with prior research (Adriaanse, Gollwitzer, De Ridder, De Wit, & Kroese, 2011), findings thus indicate that an implementation intention may not completely erase unwanted behavior, but rather help people cope with the urge to overindulge. Thus, the seemingly wise precaution to specify more than one response to cope with temptation may ironically backfire and foster hedonic overconsumption. Moreover, as touched upon above, dealing with the critical situation was more cognitively taxing for participants who made two or no plans, compared to those who made one plan. This indicates that it may have taken

more effort to resist the temptation of chocolate in this relatively short time span for those in the former two conditions, which may have adverse effects on subsequent attempts to exert self-control. Ample research shows that people are generally able to perform a single act of successful self-regulation: it is when they have to exert cognitive effort in subsequent self-regulatory tasks that self-regulation failure is likely to occur (Baumeister, Gailliot, DeWall, & Oaten, 2006). Thus, although the conditions did not differ in whether they ate any of the unhealthy food, it is possible that differences in successful self-regulation occur when a subsequent self-regulatory task is performed.

The same reasoning may apply for the second unexpected finding, namely that those who made one implementation intention and those that merely formulated a goal intention ate equal amounts of unhealthy food. The differences in cognitive load after plan enactment, i.e., participants in the control condition exerted more cognitive effort in warding off temptation than those who made a plan, increase the likelihood that further acts of self-regulation may be more successful for participants making a plan than those without plan. Making one plan evidently saves valuable cognitive resources that are necessary for successful self-regulation. In that light, it would be interesting to examine whether differences in successful self-regulation would occur between one, two or zero plans when a subsequent self-regulatory task is performed. This suggestion remains to be addressed in future research.

Overall, the present findings are consistent with previous theorizing (Gollwitzer, 2006; Webb, 2006) and recent research (Dalton & Spiller, 2012; Verhoeven et al., 2013) indicating that multiple implementation intentions are not beneficial to goal striving. The present research extends these findings by demonstrating that planning multiple responses to one and the same critical situation, rather than formulating multiple different implementation intentions for one or more goals, is also disadvantageous to goal pursuit. Moreover, this research makes an important and unique contribution to the literature by showing that the ineffectiveness of making a Plan B may not only be explained by its interference with cognitive processes during the plan formation stage, but also during the plan enactment stage. This research thus sheds light on underlying mechanisms of implementation intentions during different stages of planning that have seldom been examined to date. A thorough delineation of the possible factors and processes that underlie, and interfere with, implementation intentions' effectiveness can help explain why some planning interventions are less successful than others.

Similarly, this knowledge can be used for the development of new planning interventions aimed at behavior change.

Several limitations have to be noted. First, the effects of making a Plan B were investigated in a lab context that cannot directly be extrapolated to goal pursuit in real life settings. Importantly, we took effort to create a most natural situation for the assessment of behavior (i.e., a relaxation situation with a comfortable chair and magazines). Yet, although the controlled laboratory settings may have provided the most stringent test, future research should attempt to replicate the findings in a more ecologically valid setting. Second, although making a Plan B as investigated in the present research did not yield beneficial effects, it would be premature to conclude that making a Plan B never works. It would be important – as plans seem to defy flexibility at the cost of successful goal pursuit (e.g., Bayuk et al., 2012) – to examine circumstances or ways in which planned flexibility facilitates rather than hinders goal pursuit. For example, people may be able to stay flexible while planning by including two coping strategies within the same implementation intention, e.g., "If I see chocolate, then I will use strategy A *or* B!" (cf. Wieber et al., 2009).

Another avenue for future research involves an examination of the relative contribution of the cognitive processes to the negative effects of making a Plan B that were identified in the current study (i.e., plan encoding and plan enactment). Future research should examine these processes at different stages in conjunction. Also, although the present findings indicate that motivational processes do not account for the negative effects of making a Plan B, numerous studies have shown that these processes can also operate and drive self-regulation on an implicit level (e.g., Aarts, Gollwitzer, & Hassin, 2004). Whether implementation intention(s) influence motivation implicitly is thus an important avenue for future research (cf. Webb & Sheeran, 2008a).

To conclude, contrary to the intuitive belief that planned flexibility in goal-directed responses to an uncertain and unpredictable goal-threatening situation is a blessing, it may in fact sometimes be a curse. Rather than promoting efficient, effortless, and successful goal attainment – as is assumed to occur by planning – planned flexibility increases the likelihood that self-regulation failure will occur. When it comes to planning, then, it may actually be better to be sorry than safe.

Footnotes

[1] For the mean RTs on Strategy A of both blocks, the ANCOVA showed a marginally significant interaction effect between Condition and Prime, $F(1,150) = 2.76$, $p = .10$. For the mean RTs on Strategy B for both blocks, the ANCOVA showed a significant interaction effect between Condition and Prime, $F(1,150) = 4.35$, $p = .04$, $p\eta^2 = .03$.

[2] For the AB condition, a mean score of the motivation for the first and second plan was computed. In Study 1, the AB condition was more motivated to execute Strategy B (M = 5.43; SD = 1.40) than Strategy A (M = 4.89; SD = 1.50), $t(78) = -3.07$, $p < .01$. In Study 2, the AB condition was more motivated to execute Strategy A (M = 5.28, SD = 1.56) than Strategy B (M = 4.55, SD = 1.38), $t(28) = 3.91$, $p < .01$.

[3] It should be noted that a marginally significant interaction between Condition and Order of Strategy Presentation emerged, $F(1,152) = 3.67$, $p = .06$. When 'distraction' (Strategy A) was presented first in the LDT, there were no differences between the A condition (M = 575.13, SD = 157.28) and the AB condition (M = 596.21, SD = 157.57) in reaction times to 'replacement' (Strategy B), $p = .49$. However, when 'replacement' (Strategy B) was presented first in the LDT, the AB condition reacted faster (M = 543.42, SD = 155.70) to 'replacement' (Strategy B) than the A condition (M = 610.06, SD = 155.51), $p = .05$. Importantly, these effects were independent of whether participants were presented with the Situation Prime or a Neutral Prime before the strategy, and therefore are not relevant to the critical situation-response associations that were the main interest of this research.

[4] Although it would be of interest to examine whether the people who chose 'replacement' as their strategy ate more grapes than those who chose another strategy, the other strategies – even when categorized together – were chosen by too few participants to draw meaningful conclusions from analyses.

[5] Two different technical errors occurred. For 9 participants, the display settings of the laptop were incompatible with the default display settings in E-prime, causing both the fixation cross and the letter strings to be displayed at the left rather than the center of the screen. For an additional 14 participants, rather than displaying the fixation cross and letter string in the center, the letter string was presented at the far right end of the screen, while the fixation cross was at the center.

Chapter 4:
The role of pre-treatment proactive coping skills in successful weight management

Submitted for publication as:

Vinkers, C.D.W., Adriaanse, M.A., Kroese, F.M., & De Ridder, D.T.D. The role of pre-treatment proactive coping skills in successful weight management

Abstract

Objectives: Proactive coping encompasses future-oriented self-regulatory skills that help people prepare for future difficulties before they occur, such as planning and monitoring. The aim of the present study was to examine the interplay between pre-treatment proactive coping skills and expected difficulties during weight loss in determining successful weight management. *Method:* Obese and overweight Dutch adults (N = 119) who enrolled in a weight management intervention reported their level of proactive coping skills and expected difficulties at the start of intervention. Two months later, weight loss was assessed via self-report. *Results:* Results show that the detrimental effects of a low level of proactive coping skills were compensated by the expectation that many difficulties would accompany the weight loss attempt. Also, pre-treatment proactive coping skills did not predict weight loss success above and beyond self-efficacy and socio-demographic factors (e.g., gender). *Conclusion:* It is concluded that future-oriented self-regulatory skills and beliefs about impending difficulties at the start of intervention may have predictive value for subsequent success in weight management.

The alarmingly high rates of obesity and overweight people in the past decades have spurred on much research into effective ways to engender successful weight management (Wing, 2002). Many different interventions have been developed and implemented to help people lose weight, but their effectiveness has proven modest at best and differs widely between individuals (Brownell, 2010). To gain insight in why some people succeed in losing weight whereas others fail, research has attempted to identify pre-treatment factors that may predict whether people are successful in losing weight (e.g, Teixeira et al., 2004; Teixeira, Going, Sardinha, & Lohman, 2005). The resulting evidence, however, is mixed and mainly suggestive: few pre-treatment factors have been shown to reliably predict weight loss (Stubbs et al., 2011). Most studies, however, examined a limited number of characteristics to predict weight loss, most notably motivational and demographic characteristics (Teixeira et al., 2005), which may have led research to overlook other factors that also may have predictive value for success in weight loss. Specifically, to our knowledge, no research to date has examined whether people's level of self-regulatory skills at the beginning of intervention affects their subsequent success. This is surprising as self-regulatory skills are widely acknowledged as an important prerequisite for success in weight loss (Wadden & Foster, 2000). In the present study, we examine whether pre-treatment proactive coping skills (Aspinwall & Taylor, 1997) predict successful weight loss in an overweight and obese community sample in the context of a weight management intervention.

Proactive coping refers to 'efforts undertaken in advance of a potentially stressful event to prevent it or to modify its form before it occurs' (Aspinwall & Taylor, 1997, p. 417). In the present paper, we follow Aspinwall and Taylor's (1997) conceptualization of proactive coping as a set of future-oriented self-regulatory skills that help people anticipate and prepare for future difficulties *before* they (may or may not) occur. Specifically, proactive coping skills associated with weight loss are the accumulation of resources (e.g., social support), the detection and appraisal of potential future events that form obstacles to successful weight loss (e.g., being tempted by chocolate at a birthday party), preliminary coping efforts (e.g., making a plan to cope with temptation), and the elicitation and use of feedback after the obstacle has taken place (e.g., evaluate whether the plan has worked). The active, future-oriented and malleable nature of proactive coping skills is what makes it such a promising tool to help people achieve weight loss. As the road to successful weight management is

generally rife with many tempting and hence goal-threatening situations (akin to the above 'stressful events'), anticipatory, preparatory and coping skills are an absolute necessity to successfully ward them off (Aspinwall & Taylor, 1997; Carels, Douglass, Cacciapaglia, & O'Brien, 2004; Marlatt & Gordon, 1985). Indeed, there is evidence demonstrating the potential advantageous role of proactive coping in successful weight management: Thoolen and colleagues (2009) demonstrated that diabetes patients who participated in an intervention aimed at improving proactive coping skills were more successful in sustained weight loss than the control group. The suggestion that proactive coping skills predict successful weight management, however, has never been directly tested.

Although proactive coping skills can be effectively developed through intervention (Thoolen et al., 2009; Bode, De Ridder, & Bensing, 2006), they are also skills that most people already apply, at least to some degree, to a wide variety of self-regulatory tasks and goals in daily life (Aspinwall, 2005). Moreover, there are factors that predispose some people more than others to proactively foresee and deal with future adverse events, such as education level and future temporal orientation (Holman & Silver, 2005; Ouwehand, De Ridder, & Bensing, 2008a; 2008b). This suggests that, due to experience or predisposing factors, people may considerably differ in the extent to which they are adept at proactive coping when they enter weight loss treatment. As proactive coping skills are likely to positively influence weight loss (e.g., Thoolen et al., 2009), we expect that the more skilled people are in proactive coping before they enter a weight management intervention, the more success in weight management they will have during the intervention. In the present study, we investigate the role of pre-treatment proactive coping skills in light of a related and potentially important predictor of weight loss, expected difficulties, on which we elaborate next.

When people enter weight loss treatment, they typically have a general idea about the extent to which the process of losing weight will be difficult, i.e., whether there will be many or few situations in which their weight loss goal will be put to the test (Prochaska et al., 1994). The extent to which people generally expect difficulties to occur, referred to as 'expected difficulties' throughout the remainder of this paper, is a relatively underexamined factor that may have an important effect on motivation and success in health behavior change (Carels et al., 2005; Clark, Pera, Goldstein, Thebarge, & Guise, 1996; Glasgow, Hampson, Stryker, & Ruggiero, 1997; Oettingen & Wadden,

1991; Prochaska et al., 1994). Expected difficulties are relevant to examine in conjunction with proactive coping skills as a pre-treatment predictor of weight loss, because both are related to the anticipation of threats to goal attainment. Importantly, whereas proactive coping skills allow people to identify and deal with *specific* future difficulties, expected difficulties refers to a more global expectation towards the *number* of difficulties that will occur per se, regardless of how these difficulties manifest themselves. Another important difference is that proactive coping entails that people actively screen and prepare for future difficulties, while expected difficulties merely encompass the extent to which people expect difficulties without active and deliberate preparation.

Although there are few studies to date that directly examined the impact of expected difficulties on weight loss, there is on the one hand evidence suggesting that the expectation of difficulties makes people more vigilant towards, and therefore prepared for, upcoming future events that may derail goal pursuit (Aspinwall, 2005; Oettingen & Wadden, 1991; Polivy & Herman, 2002). This suggests that the expectation that many difficulties will occur is beneficial to weight management, as it may exert a compensatory function by inducing preparatory actions. On the other hand, however, it has also been shown that many expected difficulties may elicit discouragement (e.g., Clark et al., 1996; Prochaska et al., 1994), which implies that it may be beneficial to expect few rather than many difficulties during a weight loss attempt. However, we propose that the effect of expected difficulties, whether beneficial or detrimental, is unlikely to occur at a high level of pre-treatment proactive coping skills. After all, proactive coping entails that people are skilled at foreseeing and bracing themselves for future difficulties, which suggests that it does not matter whether many or few difficulties are expected to ensue for success in weight management. We expect, in other words, that the effect of expected difficulties on successful weight management only occurs at a low level of proactive coping skills. As there is no compelling a priori reason to expect that either many or few expected difficulties are beneficial to success in weight management when people lack the ability to proactively recognize difficulties that lie ahead, we examine this issue in an exploratory fashion.

To summarize, we examined the interplay between proactive coping skills and expected difficulties at the start of intervention in determining weight loss after having completed the intervention. We tested the predictive value of these factors in a sample

of overweight and obese people who participated in a weight management intervention. In doing so, we controlled for factors usually included in studies investigating pre-treatment predictors of weight loss (i.e., self-efficacy and sociodemographic factors; cf. Stubbs et al., 2011). With this study, we aim to fill two important gaps in the literature. First, we examine the predictive value of future-oriented self-regulatory skills (i.e., proactive coping skills) for weight loss, which despite their central role in weight loss (Wing, 2002) have to our knowledge never been included as a potential pre-treatment predictor for success in weight management interventions. Second, in contrast to prior research, we examine the interplay between predictors rather than merely their effects in isolation, which matches the notion of weight loss as a multiply determined process that is characterized by a complex interplay of multiple factors (Wadden, Brownell & Foster, 2002). As a result, we contribute to a more fine-grained understanding of pre-treatment factors that determine when and for whom weight management interventions work, which helps matching individuals to different treatments (Brownell & Wadden, 1991).

Method

Participants

Of the 185 participants who were allocated to the intervention, 66 were excluded from analyses: 31 failed to show up or did not return their baseline questionnaire, 31 dropped out and four participants failed to report their weight at t1, which is the critical dependent variable in this paper. Multiple separate ANOVAs and Chi-Square tests demonstrated that included and excluded participants did not differ on all baseline variables in this paper (see Table 1), all *p*s < .22. The final sample (N = 119), consisting of 58 men and 61 women, had an average age of 55.92 years (SD = 5.77), and an average BMI of 29.00 (SD = 2.00; 69.7 % overweight vs. 30.3 % obese (BMI > 30). Please note that as our research question only pertains to weight loss success in the context of a weight management intervention, the present sample consisted of intervention participants only.

Procedure

As the procedure of the intervention is extensively reported elsewhere (Vinkers, Adriaanse, Kroese, & De Ridder, 2013), we only provide a brief description of the first eight weeks of the intervention, i.e., the initial phase, which is the focus of the current analyses. The initial phase of the self-management intervention, week 1-8, entailed one

(1-hour) individual session with the group trainer (a trained dietician), and three (2-hour) bi-weekly group sessions (6-8 members). During sessions, participants were taught a 5-step plan targeting personally relevant dietary goals, which consisted of a) concrete, realistic goal setting; b) exploring conditions and barriers to goal attainment; c) appraisal of the barriers to goal attainment; d) making specific plans for goal attainment and mental simulation of plans; and e) evaluating progress. Measures relevant to the current study aims were employed at baseline (T0) and after the initial phase, i.e., 8 weeks after the start (T1). Questionnaires were sent and returned by mail 2-3 weeks before (T0) and 1-2 weeks after the initial phase (T1). Full details of the trial protocol can be found at www.trialregister.nl, trial number 2791, and are available upon request by the first author.

Measures.

Control variables. To control for demographic variables, we included gender, age, education level (primary education, high/vocational school, and higher education), and employment status (yes/no). As self-efficacy has been identified as pre-treatment predictor for weight loss (Stubbs et al., 2011), we also controlled for self-efficacy at baseline. Self-efficacy was measured by 6 items tapping participants' confidence in successfully self-managing a healthy diet. Each item started with "How confident are you that you are able to…" (sample item: "…adhere to the guidelines for a healthy diet") with scores ranging from 1 (*not at all*) to 7 (*completely*); $\alpha = .80$).

Proactive Coping Skills. Proactive coping skills were measured with the Utrecht Proactive Coping Competence (UPCC; Bode, Thoolen, & De Ridder, 2008), which is a 21-item questionnaire to assess individuals' competency in skills associated with proactive coping. Participants were instructed to rate the extent to which they have each skill at their disposal in the context of weight-management. The 21 items (example: "Making realistic plans") were measured on 4-point scales, ranging from 1 (*not competent*) to 4 (*very competent*); $\alpha = .87$.

Expected Difficulties. Expected Difficulties was measured by one item: "To which extent do you expect difficulties with maintaining weight loss in the long term?", ranging from 1*(no difficulties at all)* to 7*(many difficulties)*.

BMI and Weight Loss. Participants reported their height and weight at baseline (T0), and after the initial phase of the intervention (T1). Baseline BMI (body mass index) was calculated (weight in kg/(height in m^2)) and weight change was calculated

by subtracting T0 from T1 values. This means that negative numbers indicate weight loss, whereas positive numbers indicate weight gain.

Strategy of Analysis.

Analyses were run for the main dependent variable, i.e., weight change during the initial phase of the intervention. Prior to analyses, all predictor variables were centered and a two-way interaction term was calculated for proactive coping skills and expected difficulties (Aiken & West, 1991). We employed hierarchical regression analysis, which consisted of the following steps: in Step 1, demographic variables (age, gender, employment status, and education level) and baseline self-efficacy were entered. In Step 2, baseline self-reported BMI was entered. In Step 3, the main effects of proactive coping skills and expected difficulties were assessed, and in the final Step 4, it was examined if there was a significant interaction between these two variables.

Results

Descriptive Statistics.

Most participants were employed (68.9 %, N = 82), and completed high/vocational education or higher education (N = 117; 98.4 %). The sample had an overall moderate level of self-efficacy (M = 4.64, SD = .93). As for the main independent variables, participants were moderately skilled at proactive coping (M = 2.82, SD = .37) and expected a moderate number of difficulties towards weight loss in the long-term (M = 4.98, SD = 1.25).

Main analysis.

Step 1 in the stepwise regression analysis showed that all demographic variables, except for age, predicted weight change. Females, higher educated and unemployed participants lost less weight than their male, less educated and employed counterparts (see Table 1). Baseline self-efficacy was not associated with weight change. Step 2 demonstrated that higher baseline BMI predicted less weight loss two months later, whereas Step 3 showed that neither proactive coping skills nor expected difficulties, controlling for baseline BMI, self-efficacy and demographic variables, predicted weight change. Step 4, however, showed that the interaction between proactive coping skills and expected difficulties was significant.

Table 1. *Results from hierarchical multiple regression analyses with weight change (T1-T0) as outcome measure*

	β	Δ R^2
Step 1		.16**
Gender (0 = male, 1 = female)	.27**	
Education level (1 vs. 3)	.17*	
Education level (2 vs. 3)	.11	
Age	-.11	
Employment status (0 = not employed, 1 = employed)	-.26**	
Self-efficacy	-.10	
Step 2		.04*
Baseline BMI	.21*	
Step 3		.01
Expected Difficulties (ED)	-.13	
Proactive Coping Skills (PC)	-.05	
Step 4		.04**
Interaction ED * PC	.24**	
Model R^2		.25**

Note. * $p < .05$; ** $p < .01$. Beta is based on the final model, Δ R^2 indicates the change in predicted variance with each new step.

A simple slopes analysis (see Figure 1) demonstrated that the effect of expected difficulties was not significant for those with high (+ 1 SD) proactive coping skills, p = .42. For those with low (-1 SD) proactive coping skills, however, more expected difficulties yielded more weight loss, p = .03.

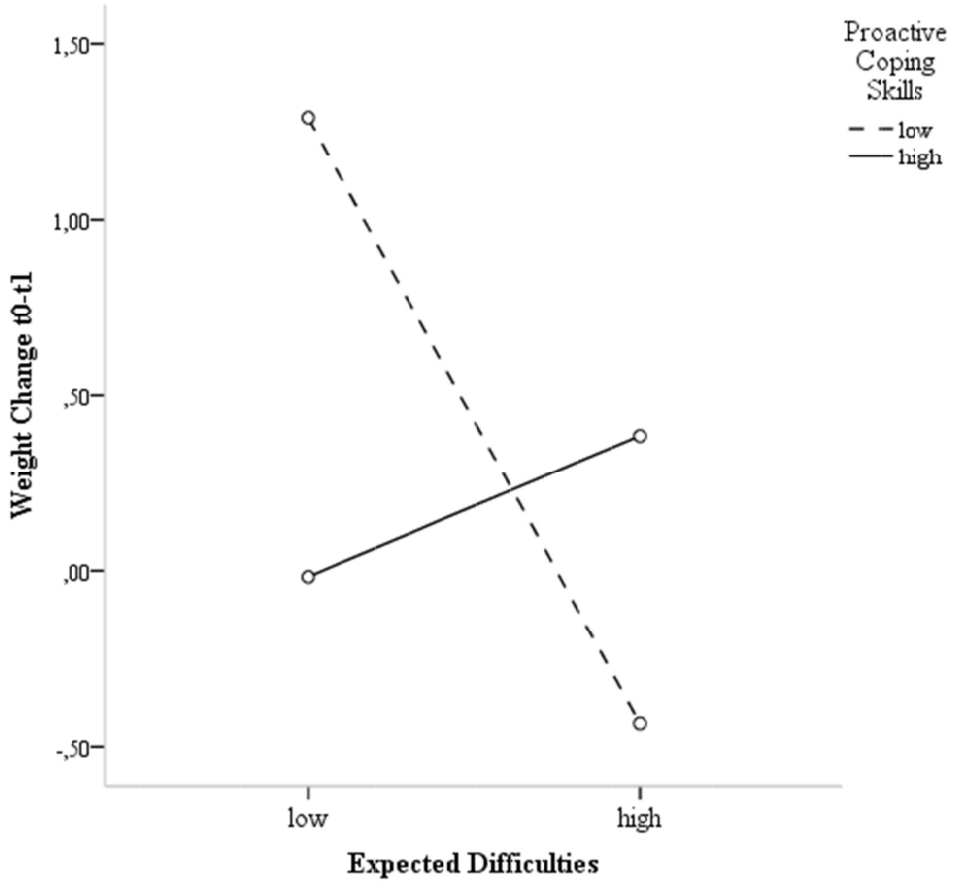

Figure 1. Weight change from T0 to T1 at high (+ 1 SD) and low (- 1 SD) values of proactive coping skills and expected difficulties.

Discussion

The aim of the current study was to examine the role of proactive coping skills in weight loss, and specifically, whether proactive coping skills and expected difficulties interact to determine weight loss in the context of a weight management intervention. Results show that, as expected, only when people had a low level of proactive skills before intervention, more concurrent expected difficulties predicted more subsequent weight loss during intervention. When people had a high level of proactive coping skills, in

contrast, beliefs about the number of difficulties that would ensue did not differentially influence weight loss. Contrary to expectations, it was found that people's level of proactive coping skills by itself did not predict weight loss, nor did their level of self-efficacy and expected difficulties in isolation. In contrast, most sociodemographic factors, such as gender and education level, did predict weight loss above and beyond all other included pre-treatment factors.

In line with expectations, findings show that expected difficulties only differentially affected weight loss when people were relatively unskilled in proactive coping before the start of treatment. Specifically, the expectation of few difficulties during goal pursuit resulted in weight gain over the course of two months, whereas many expected difficulties led to weight maintenance during this period. Strikingly, our results show that expecting few difficulties is especially detrimental for success in weight management as it produced to a weight gain of 1.5 kilos in two months. These results indicate that when people lack the skills to proactively foresee and deal with future difficulties, they are better off expecting many rather than (too) few difficulties during their weight loss attempt. As an explanation, we propose that the expectation of difficulties may compensate for a lack of proactive coping skills by evoking preparatory actions. Thus, people who expected their weight loss goal to be challenged by situations that would tempt them to (temporarily) give up their goal may have prepared for them, and consequently, successfully managed to maintain their weight. However, it is also possible that the effects of expected difficulties occurred through motivational mechanisms. For instance, prior research suggests that people strategically match the force with which they pursue a goal to the motivation and effort needed in light of the goal's difficulty (e.g., Silvia, McCord, & Gendolla, 2010). This suggests that the expectation of many difficulties may have boosted motivation and effort to ensure successful weight management despite the presence of these difficulties. Clearly, more research is needed to uncover the mechanism(s) through which expected difficulties affect weight management.

Unexpectedly, we failed to find that more pre-treatment proactive coping skills yielded more success in subsequent weight loss, which contradicts the suggested beneficial role of proactive coping skills in successful weight management by prior research and theory (Aspinwall & Taylor, 1997; Thoolen et al., 2009). It is interesting, however, that when expected difficulties were taken into account, a high level of

proactive coping skills at the start of intervention neither produced weight loss nor weight gain. This may indicate that proactive coping skills play a more important role in weight gain prevention than in weight loss. That is, the hallmark of proactive coping is that people prepare for events that threaten successful goal adherence (Aspinwall & Taylor, 1997), which means that people who engage in proactive coping are successful in warding off events that would have otherwise resulted in lapses into unwanted behavior, i.e., that may have led to weight gain. Nonetheless, there are other explanations possible. One possibility is that the current weight management intervention was designed to promote the development of proactive coping skills, which may have rendered baseline values less predictive of weight loss than would improvements throughout the program (Teixeira et al., 2005). Another explanation may be that having proactive coping skills at one's disposal is a necessary, but probably not a sufficient condition to engender weight loss. That is, having the skills to successfully self-regulate weight-related behavior does not guarantee that they will be put to use. In line with this suggestion, recent research demonstrates that volitional and motivational components work in conjunction to produce changes in health behavior, as opposed to each component alone (French, Stevenson, & Michie, 2012). This indicates that it may be essential for future research to take motivational factors into account when considering the influence of proactive coping skills on weight management.

Another striking finding is that pre-treatment self-efficacy did not predict weight loss. Although this aligns with the current conflicting evidence regarding the predictive value of pre-treatment self-efficacy on weight loss (Stubbs et al., 2011), it still is surprising as self-efficacy is widely hailed as one of the most important predictors of successful initiation of weight loss attempts (Rothman, 2000). Apparently, self-efficacy alone, despite its central role in motivating people to engage in a weight loss attempt, may not prepare people for the difficulties they may face during their attempt. That is, although self-efficacy may be a prerequisite to undertake behavior change, it may not be sufficient to actually engage in successful weight loss for which self-regulatory skills and strategies are needed (Wing, 2002). It is also possible that people are unable to accurately assess their ability to perform the behaviors necessary to produce weight loss, which may weaken the predictive validity of pre-treatment self-efficacy (Teixeira et al., 2005). This implies that changes in self-efficacy during intervention, when people have had the opportunity to experience whether they are indeed able to lose weight,

may prove a stronger predictor for weight loss than self-efficacy at baseline. This suggestion should be tested in further studies on predictors of weight loss during intervention.

Some limitations must be noted. First, the hypotheses were tested in an obese and overweight middle-aged population that was included in a particular weight management intervention. We therefore cannot exclude the possibility that the specific treatment that participants underwent may have played a role in the current findings. More research is needed to determine if results can be generalized to other weight management interventions and different samples. Second, we only measured relatively short-term weight loss; it would be worthwhile for further research to examine whether the pre-treatment factors under investigation would remain predictive of weight loss over a longer period of time. Third, the effects found in this study were small, which could be partly due to the large number of predictors in combination with the relatively small sample size. It is also possible that we failed to include pre-treatment factors that may have explained a substantial additional amount of variance in weight loss, such as motivation (Teixeira et al., 2004; 2005). It should be noted, however, that the amount of explained variance in the present study is similar to those of prior studies on pre-treatment predictors of weight loss (Stubbs et al., 2011). Nonetheless, future research should replicate the results in larger samples and include pre-treatment factors that also may predict weight loss.

Notwithstanding these limitations, the present study has several important implications. First, our research points towards the importance of broadening the scope of potential pre-treatment predictors of weight loss. Specifically, people's future-oriented self-regulatory skills and beliefs about impending difficulties during weight loss should be taken into account when they enter treatment, as they may influence success during intervention. Second, the current findings suggest that it is important to move beyond investigating pre-treatment factors in isolation to predict weight management success. Instead, research should shift its attention towards the interplay between several predictors, which more accurately matches the complexity of weight loss determinants (Wadden et al., 2002). Third, findings indicate that optimistic expectations about weight loss, in this case as manifested by the belief that the road to successful weight management is relatively obstacle-free, may also have detrimental effects on success, which supports previous findings demonstrating that being

(over)optimistic may not be helpful for all people alike (cf. Oettingen & Wadden, 1991; Polivy & Herman, 2002). This is important knowledge as it is widely assumed that when people enter treatment, they benefit most from thinking about the positive outcomes rather than the difficulties ahead (Rothman, 2000). Our results imply that explicitly pointing out that many difficulties will ensue before intervention, i.e., the costs rather than the benefits of behavior change, may be more conducive to success than previously thought. Overall, the present study adds to an improved understanding of the pre-treatment factors that contribute to successful weight management during intervention among a clinically relevant population. With the growing prevalence of obesity and the widely varying success rates of current weight management interventions, it is both important and timely to delineate when and for whom such interventions work.

Chapter 5:

Efficacy of a self-management intervention for weight control in overweight and obese adults: A Randomized Controlled Trial

Published as:

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Abstract

Background Brief self-management interventions to engender successful weight maintenance are seldom tested in obese and overweight populations without diabetes.

Purpose To test the efficacy of the intervention, aimed at improving proactive coping, in obese and overweight adults at risk for diabetes.

Methods Participants (N = 255) were randomly assigned to two experimental groups (N = 185) and a control group (N = 70). Experimental groups received the same intervention in week 1-8 (initial phase) and booster sessions with different content ("standard" vs. "relapse prevention") during week 9-24 (continuance phase). Primary outcomes were proactive coping, diet and BMI at four time points (1 year between first and last measurement).

Results Experimental groups improved in proactive coping during the initial phase and BMI during the continuance phase, whereas the control group did not. No differences emerged in diet.

Conclusions Brief self-management interventions can play a preventive role in chronic illnesses associated with obesity.

Obesity poses serious health threats, including higher risks of developing chronic illnesses like type 2 diabetes (Kopelman, 2007). Interventions that engender successful weight management are therefore needed to prevent the development of these illnesses. In the present study, we examine the efficacy of a self-management intervention aimed at maintaining weight loss in overweight and obese adults at risk for diabetes. This self-management intervention (Thoolen, De Ridder, Bensing, Rutten, & Gorter, 2008) is built on the theoretical framework of Proactive Coping Theory (Aspinwall & Taylor, 1997), which focuses on preparation for potential threats to goal adherence before they occur. Prior research indicates that people who develop proactive coping skills are more successful in dealing with situations that may promote lapses into unwanted behavior (Thoolen, De Ridder, Bensing, & Rutten, 2009). As such, proactive coping skills may facilitate initiation and maintenance of successful weight management. The current intervention combines the future-oriented proactive approach with self-regulation strategies that facilitate behavior change, such as goal-setting and planning (Michie, Abraham, Whittington, McAteer, & Gupta, 2009).

Although interventions that encourage self-management and promote the use of self-regulation strategies have been presented as a viable approach to sustained behavior change, most programs require intensive treatment (e.g., weekly sessions) for at least six months (Appel et al., 2011; Knowler et al., 2002; Venditti & Kramer, 2012). Although such interventions have demonstrated the effectiveness of behavioral modification treatment (Wing, 2002), brief and less intensive alternatives have rarely been implemented in overweight and obese populations. This raises the question whether weight management interventions that are relatively easy to disseminate and require fewer resources could also render success in weight-related behavior change (Glasgow, Lichtenstein, & Marcus, 2003). Prior research suggests that brief interventions with relatively low intensity can indeed yield long-lasting effects on weight management (Stahre, Tärnell, Håkanson, & Hällström, 2007). Moreover, it has been shown that the current intervention, albeit in a sample of type 2 diabetes patients, yielded improved diet, exercise, and weight loss up to 9 months after the program (Thoolen et al., 2009). The present study aims to replicate and extend this research in three ways.

First, the intervention is examined in a population of overweight people at risk for diabetes rather than diabetes patients. These populations are sufficiently similar to

render it likely that the intervention is effective as they struggle with comparable self-regulatory challenges regarding diet and physical activity (Astrup & Finer, 2000). However, the efficacy of the intervention may also differ for the two populations. That is, obese diabetic patients may be less successful than their non-diabetic counterparts in weight management, possibly due to the weight-altering properties of antidiabetic medication (Finer, Ryan, Renz, & Hewkin, 2006). Conversely, diabetic patients may be more successful in weight management, as they may be more aware of the urgency of behavior change (Swift, Glazebrook, Anness, & Goddard, 2009).

Second, we extend prior research by examining whether booster sessions have added value for weight-related outcomes, as experts argue that extending the duration of treatment is a viable way to stabilize behavior changes (Jeffery et al., 2000; Wing, Tate, Gorin, Raynor, & Fava, 2006). Indeed, research demonstrated that additional sessions produce promising results in this regard (e.g., Jeffery et al., 2000; Perri & Corsica, 2002; West et al., 2011). Others, however, found that extended interventions do not necessarily lead to better outcomes (Kroese, Adriaanse, & De Ridder, 2012; Leibbrand & Fichter, 2002; Svetkey et al., 2008). The present study therefore examines whether booster sessions bolster effects obtained during the initial phase of the intervention. Also, as it is unclear whether the specific content of booster sessions contributes to improved outcomes, we compare two different types. The first type of booster sessions, referred to as "relapse prevention" boosters throughout the remainder of this paper, in which relapse prevention strategies are taught, i.e., skills to anticipate and plan for high-risk situations that facilitate relapse into unwanted behavior. These skills have been proposed to promote behavior change maintenance (Gollwitzer, 1999; Marlatt & Gordon, 1985; Perri et al., 2001). We examined whether these "relapse prevention" boosters yield additional benefits compared to "standard" booster sessions, in which the same behavioral strategies were reinforced as during the initial phase of the intervention.

Third, the present study contributes to the existing body of research by including a strict and active control group, which comprised group sessions and multiple written assignments. A common methodological shortcoming of many weight management interventions is that control groups receive usual care or otherwise minimal attention (Norris et al., 2005), such as providing education material without further contact throughout the intervention (e.g., Appel et al., 2011; Thoolen et al., 2009). This makes

the comparison inherently favorably biased towards the intervention's effects, because potential intervention effects can be partly due to the amount of attention that people receive and/or the frequency with which they are reminded of their long-term goal. The present control group is strict, and deviates from those in previous studies, in the sense that we controlled for non-specific intervention effects by providing contact and reminders with the same frequency as in, and concurrently in time with, the experimental groups.

In sum, we examine the efficacy of an intervention aimed at increasing proactive coping skills and self-management behaviors a) in an overweight population without diabetes; b) with the addition of booster sessions; and c) against a strict control group. We report outcome measures in psychological, behavioral, and biomedical domains. In accordance with the intervention's principal focus, the primary outcomes per domain were proactive coping skills, diet and weight, respectively.

Method

Participants

We contacted 983 people by postal mail from the control arm of the Randomized Controlled Trial for Screening for Type 2 Diabetes in Obese Subjects (De Koning, 2005). Inclusion criteria were a Body Mass Index (BMI) of > 25 and < 40 and being committed to improving weight self-management, as assessed by consent in response to an invitation letter explaining the target population and content of the intervention. Exclusion criteria were a diabetes diagnosis and the involvement in other treatment for overweight. Of the 486 people who responded, 58 (11.9 %) were ineligible and 173 (35.6 %) declined to participate (see Figure 1 for the CONSORT flow diagram). Of the resulting 255 (52.5 %), 185 people were allocated to the two experimental conditions (standard vs. relapse prevention) and 70 people were allocated to the control condition. No baseline data were collected from 9.7 % (N = 18) of experimental and 14.3 % (N = 10) of control participants (14.3 %), because these participants failed to return the questionnaire.

Overall, the sample had an average age of 55.69 years (SD = 5.84) and comprised native Dutch people. Most participants' (67.8 %; N = 97) education level was high/vocational school; 30.1 % (N = 43) completed higher education, one completed primary school and two failed to indicate their education level. The majority was

employed (70.6 %) and male (59.4 %). See Table 1 for the baselines measures by condition.

Table 1. *Baseline measures of intervention and control groups*

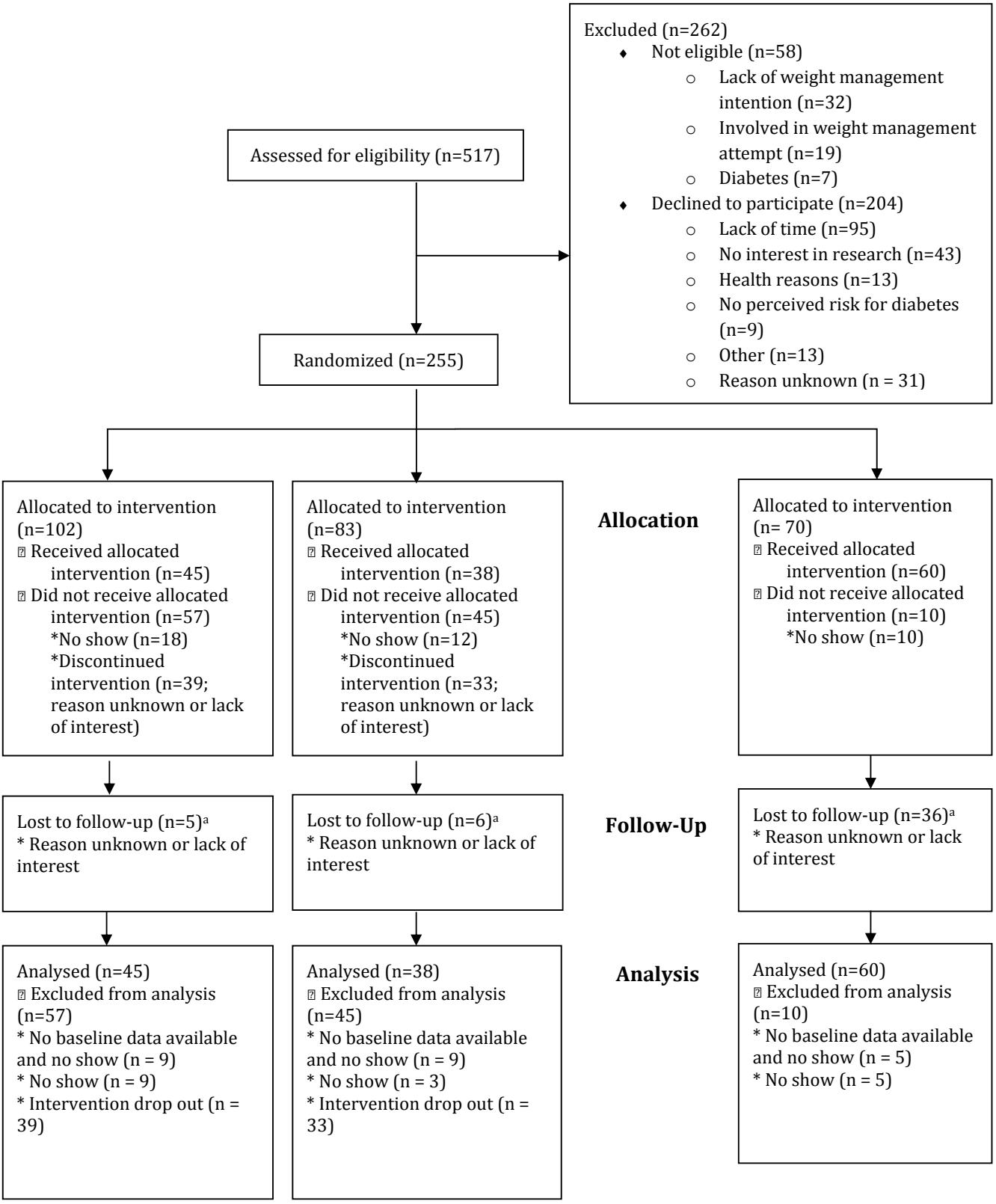
	Experimental standard	Experimental relapse prevention	Control group
	M (SD)	M (SD)	M (SD)
N	45	38	60
Demographic measures			
Sex – no. (% Male)	26 (57.8 %)	21 (55.3 %)	38 (63.3 %)
Age	55.84 (5.45)	55.26 (5.80)	55.85 (6.23)
Education level[1]	0 % (1); 75.6 % (2); 24.4 % (3)	2.6 % (1); 50 % (2); 47.4 % (3)	0 % (1); 73.3 % (2); 23.3 % (3)
Employed – no. (%)	34 (75.6 %)	25 (65.8 %)	42 (70.0 %)
Prior weight loss attempts	55.6 % (0); 26.7 % (1); 17.8 % (>1)	71.1 % (0); 10.5 % (1); 18.4 % (>1)	84.7 % (0); 6.8 % (1); 8.5 % (>1)
Psychological measures			
Self-efficacy	4.57 (.88)	4.68 (.93)	4.71 (.92)
Goal commitment	5.34 (.78)	5.33 (.95)	5.28 (.77)
Proactive coping	2.83 (.44)	2.78 (.36)	2.84 (.41)
Sense of responsibility	6.49 (.58)	6.49 (.55)	6.30 (.67)
Behavioral measures			
Diet	2.48 (.36)	2.46 (.34)	2.46 (.38)
Exercise	140.67 (69.88)	119.77 (64.23)	141.26 (68.33)
Biomedical measures			
BMI self-reported	29.10 (1.35)	28.28 (2.10)	29.19 (2.13)
BMI measured	29.45 (1.46)	29.11 (2.25)	30.01 (2.42)
Hba1c[2]	38.75 (2.82)	38.95 (2.62)	38.65 (3.04)
Glucose	5.47 (.45)	5.52 (.89)	5.43 (.38)
HDL cholesterol	1.41 (.37)	1.37 (.36)	1.50 (.86)
LDL cholesterol	3.67 (.77)	3.84 (.93)	4.05 (.95)
Tryglicerides	1.76 (1.40)	1.95 (1.90)	1.63 (.73)

[1] 1 = primary education; 2 = high/vocational school; 3 = higher education

[2] All blood values are measured in mmol/l

Note. Reported means are restricted to participants who completed the intervention, except for the control condition which followed a different format that prohibited the assessment of drop out.

Figure 1. CONSORT Flow Diagram



[a] Please note that data from participants lost to follow-up were imputed and therefore are included in the analyses

Design

This study was a single-blind, parallel-group randomized controlled trial, with balanced allocation using simple randomization to two experimental groups and the control group [1:1:1 ratio]. Participants were allocated to conditions using the randomization function in Excel, and assigned by the first author. The protocol was approved by the Medical Ethical Committee at Utrecht University. Written informed consent was obtained from all participants after the nature of the procedure had been fully explained to them.

Measures for all groups were employed at baseline (T0), after the initial phase (T1), 1 month after the continuance phase (T2), and at follow-up 5 months thereafter, resulting in a total duration of 1 year from first to last measurement. Weight was measured by the trainers during the individual session, after the third group session (T1) and 1-4 weeks after the T2 measurement at participants' home. Participants were recruited in June 2009. The study took place in community centers in Rotterdam, The Netherlands, from October 2009 to October 2010; data collection pertaining to 1-year follow-up measures was completed in April 2011. Full details of the trial protocol can be found at www.trialregister.nl, trial number 2791.

Procedure

The intervention consisted of one individual and six group sessions during a period of 24 weeks; four group sessions during the initial phase (week 1-8) and two group sessions during the continuance phase (week 9-24). The initial phase included a one (1-hour) individual session, in which participants' motivation, dietary knowledge and expectations towards the intervention were discussed. In addition, three (2-hour) bi-weekly group sessions (6-8 participants) were given, in which participants were taught a 5-step plan targeting personally relevant dietary goals, which consisted of a) concrete, realistic goal setting; b) exploring conditions and barriers to goal attainment; c) appraisal of the barriers to goal attainment; d) making specific if-then plans for action initiation (i.e., implementation intentions; Gollwitzer, 1999) and mental simulation of plans; and e) evaluating progress (see Thoolen et al. (2009), for a detailed description). Participants were given a workbook that provided basic background information about weight management, 5-step plans, and diaries in which they monitored their progress towards their self-set goal (homework). During each session, one step of the 5-step plan

was highlighted, discussed and practiced; participants were stimulated to discuss and make use of each other's knowledge and experience with weight management.

The continuance phase, week 9-24, comprised two (2-hour) booster sessions, 2 and 4 months after the initial phase had ended. In this phase, the experimental group was divided into two groups. In the standard boosters condition, the self-regulatory skills learned during the initial phase were reinforced by repeating the 5-step plan described above. The relapse prevention boosters condition entailed an adapted version of the 5-step plan, which specifically focused on identifying and making plans for situations that would promote relapse into old unwanted habits. Importantly, whereas the 5-step plan as used in the standard condition involved making action-oriented plans (e.g., "If I have my coffee break, then I will take a low-fat snack!"), thereby promoting behavior change initiation, the adapted 5-step plan in the relapse prevention condition involved making coping-oriented plans to prevent relapse, thereby promoting behavior change maintenance (Marlatt & Gordon, 1985). Another important difference was that in the standard condition, participants continued to set new goals, while in the relapse prevention condition, participants renewed goals that have been difficult to achieve so far. Specifically, the adapted 5-step plan entailed a) renewing a goal that proved difficult to achieve in the past weeks; b) identifying specific goal-threatening situations that hindered achievement of this goal, c) identifying coping strategies to successfully deal with these goal-threatening situations; d) making specific coping-oriented implementation intentions (e.g., "If I come home from work late and I am hungry, then I will eat an apple!"; Gollwitzer, 1999); and e) evaluating the effectiveness of these coping plans.

All group sessions were led by one of seven trainers, all dieticians, who were thoroughly trained in administering the intervention. The trainers acted as coaches during sessions and did not provide dietary advice to participants. Each trainer was provided supervision after each session by mail or phone. The course of sessions followed a strict protocol as written down in a trainer manual; the supervising researcher verified adherence to the protocol by a visit to at least one of the group sessions per trainer. Although standardized notes were not taken, it was observed that all trainers strictly followed protocol. In addition, the detailed nature of the protocol (e.g., duration and content of each component per session) ensured that the likelihood of deviation from protocol was minimal. Each trainer led only one type of booster

sessions (i.e., they were blinded to the existence of different versions of booster sessions) and each intervention group was generally led by the same trainer throughout the initial and continuance phases of the intervention.

Control group. The control group attended two group sessions and received four written assignments temporally concurrent with the six sessions of the experimental groups during the initial phase (one individual session and three group sessions) and continuance phase (two booster sessions). This means that the sessions and assignments were spaced at the same interval apart as the experimental group sessions. The group sessions, scheduled temporally concurrent with the experimental groups' individual and third group session during the initial phase, were led by one of three dieticians who were explicitly required to only provide nutritional knowledge as written down in the protocol. During the sessions, in addition to nutrition education, participants were asked to make a list with 10 unhealthy eating habits, and choose one habit they wanted to change in the coming two weeks. Two written assignments, sent temporally concurrent with the experimental groups' first and second group session during the initial phase, were sent requiring participants to reflect on their goal progress and to choose another habit they intended to change. In the continuance phase, temporally concurrent with the experimental groups' booster sessions, participants were asked to change an unhealthy habit they would be able to maintain over time, and the importance of behavior maintenance was emphasized.

Measures

Demographic measures. Demographics included sex, age, education level, and employment status (yes/no). Education level was measured on a 5-point scale; to make the Dutch school system levels comparable to others, this variable was converted into three categories: primary education, high/vocational school and higher education. Prior weight loss history was assessed by 1 item, "How often have you tried to lose weight in the past?", scored as 1 (*never*), 2 (*once*), or 3 (*multiple times*).

Psychological measures.

Proactive coping. Proactive coping was measured by the Utrecht Proactive Coping Competence Scale, which is validated by prior research (Bode, Thoolen, & De Ridder, 2008). Participants were instructed to rate the extent to which they have each skill at their disposal in the context of weight-management. The 21 items, consisting of skills that together measure overall proactive coping competence (example: "Making

realistic plans"), were measured on 4-point scales, ranging from 1 (*not competent*) tot 4 (*very competent*); range α T0-T3 = .80-.91. Higher scores mean that participants are better able to identify and prepare for potential threats to goal adherence, i.e., situations in which it is difficult to overcome existing unhealthy habits.

Goal commitment. To measure goal commitment, we developed a scale consisting of 5 items used by prior research to capture both direct commitment (e.g., "How important is it to you to achieve a healthier weight?"; Locke, Latham, & Erez, 1988) and affective commitment to the goal (e.g., "How disappointed would you feel if you did not succeed…"?; Oettingen, Pak, & Schnetter, 2001). Scores ranged from 1 (*not at all*) tot 7 (*very much)*; range α T0-T3 = .77-.83.

Self-efficacy. Self-efficacy was measured by 6 items tapping participants' confidence in performing the actions necessary for successful self-management of weight and eating behavior (cf. Kuijer & De Ridder, 2003). Each item started with "How confident are you that you are able to…" (example: "…adhere to the guidelines for a healthy diet") with scores ranging from 1 (*not at all*) to 7 (*completely*); range α T0-T3 = .77-.85).

Sense of responsibility. As one core characteristic of the self-management approach is taking responsibility for one's (success in) behavior change (Funnell & Anderson, 2004), we developed 2 items capturing the extent to which participants perceived their weight management to be their own responsibility (example: "I believe it is my responsibility to bring about changes in my lifestyle to achieve a healthier weight"). These items were rated on 7-point scales, ranging from 1 (*completely disagree*) to 7 (*completely agree*); range *r* T0-T3 = .35 - .58, *p*'s < .01.

Behavioral measures.

Diet. Diet was measured by the Kristal Food Habits Questionnaire (Kristal, Shattuck, & Henry, 1990), which captures fat-related dietary habits. This questionnaire is recommended for intervention research that focuses on diet and has been shown to be as sensitive to changes in dietary habits as diet records and a food-frequency questionnaire (Glasgow, Perry, Toobert, & Hollis, 1996; Kristal, Beresford, & Lazovich, 1994). Participants rated how often they engaged in 20 dietary habits (example: "How often do you use low-fat products while cooking?"), with scores ranging from 1 (*never*) to 4 (*always*) or "not applicable"; range α T0-T3 = .71-.79.

Exercise. Exercise was measured by the Physical Activity Scale for the Elderly (PASE; Washburn, Smith, Jette, & Janney, 1993). The PASE was deemed most appropriate for the current sample, because it includes relevant domains of activity for a sedentary population (e.g., walking, light-moderate household work) which are not detected by age-neutral measures that typically focus on more strenuous forms of exercise. The PASE has been previously employed in research on a population of middle-aged diabetes patients with a sedentary lifestyle (Thoolen et al., 2009), which mirrors the age and nature of the current sample. The scale constitutes a valid measure of energy expenditure (Schuit, Schouten, Westerterp, & Saris, 1997). The 15-item scale measures the number of days and time spent in the previous week on various light, moderate and high intensity physical activities and yields a composite score (range 0-800) that forms an index of energy expenditure.

Biomedical measures.

Weight. Participants reported their height and weight at four time points (T0-T3), and were weighed by the trainer at three time points (T0-T2; see "Design"), resulting in self-reported weight as well as measured weight (body mass index = weight in kg / (height in m^2)). It is important to note that self-reported and measured BMI have been shown to be equally correlated with disease markers such as blood glucose (McAdams, van Dam & Hu, 2007), and self-reported and measured BMI were highly correlated at T1 ($r = .91$, $p < .01$) and T2 ($r = .93$, $p < .01$). Self-reported BMI can therefore be regarded as a valid alternative to measured BMI.

Blood values. At baseline (T0) and at follow-up (T3), participants' values of Hemoglobin A1c (Hba1c), fasting glucose, High- and Low-density Lipoprotein (HDL and LDL) cholesterol, and triglycerides were measured (mmol/l; American Diabetes Association).

Strategy of Analysis

Piecewise Linear Growth Curve Modeling (Piecewise-LGCM) was employed for analyzing change trajectories over time. LGCM is a relatively novel statistical procedure that has several advantages above traditional statistical techniques, e.g., a more reliable reflection of change over time and no listwise deletion (Duncan & Duncan, 2004). We used Mplus 6.0 (Muthén & Muthén, 1998-2010); the intercepts of all groups were fixed as equal, which means that potential baseline group differences were adjusted for in analyses. Also, we fixed the first slope (T0-T1) of the two experimental groups as equal,

because they received the same intervention in the initial phase. Sensitivity analyses demonstrated that participants who did not complete the intervention ("intervention drop outs", referring to those who withdrew from attending sessions rather than those who failed to complete measurements) influenced parameter estimates of completers due to Mplus' use of the Full Information Maximum Likelihood (FIML) procedure to handle missing data. Single-imputation methods for intention-to-treat analyses (e.g., Last Observation Carried Forward) are generally deemed unsuitable methods (White, Carpenter, & Horton, 2012) especially when an outcome measure concerns weight, and sufficient information over time was not available to derive adequately missing data points for multiple imputation. We therefore deemed excluding intervention drop outs most appropriate for the purpose of the present study. It is important to note, however, that no listwise deletion was employed: FIML, equivalent to multiple imputation, uses information from the available observed data to estimate the parameters of the incomplete variables (Graham, 2009). This means that the data from participants lost to follow-up (see Figure 1) are included in the analyses. As LGCM does not yield reliable or meaningful results for less than 3 slopes, blood value measures were analyzed by repeated measures ANOVAs.

Bayesian inference was used instead of traditional *p*-value significance testing, which provides a more precise and stringent method to examine effects (Kruschke, 2011). In Bayesian estimation, significance levels are determined based on whether zero is included in 90 % central credibility intervals (C.C.I.).

Results

Drop out

Figure 1 shows the rate of drop out in the experimental groups, defined as (non-)attendance during group sessions (< 2 sessions during the initial phase and no sessions during the continuance phase). During the initial phase (week 1-8), 23.8 % of randomized participants dropped out. During the continuance phase (week 9-24), an additional 21.1 % did not attend any of the booster sessions. Results of analyses pertaining to characteristics of drop outs have been extensively reported elsewhere (Vinkers, Adriaanse, & De Ridder, 2012). These show that drop outs and completers, regardless of timing of drop out, did not differ on any baseline measures, and that drop outs did not improve in self-efficacy during the initial phase, while completers did.

Psychological measures

Proactive coping. For proactive coping, only the slopes for the experimental groups were positive and significant, $\beta_{Standard}$ and $\beta_{relapse\ prevention}$ (β_S and β_{RP}) = .25 (see Table 2 and Figure 2), whereas the control group remained stable. Results thus indicate that the experimental groups both showed improvements in proactive coping during the initial phase, while the control group did not. No slopes were significant during the continuance and follow-up phase, indicating that none of the participants, regardless of condition, showed improvement or deterioration (see Figure 2, Panel A).

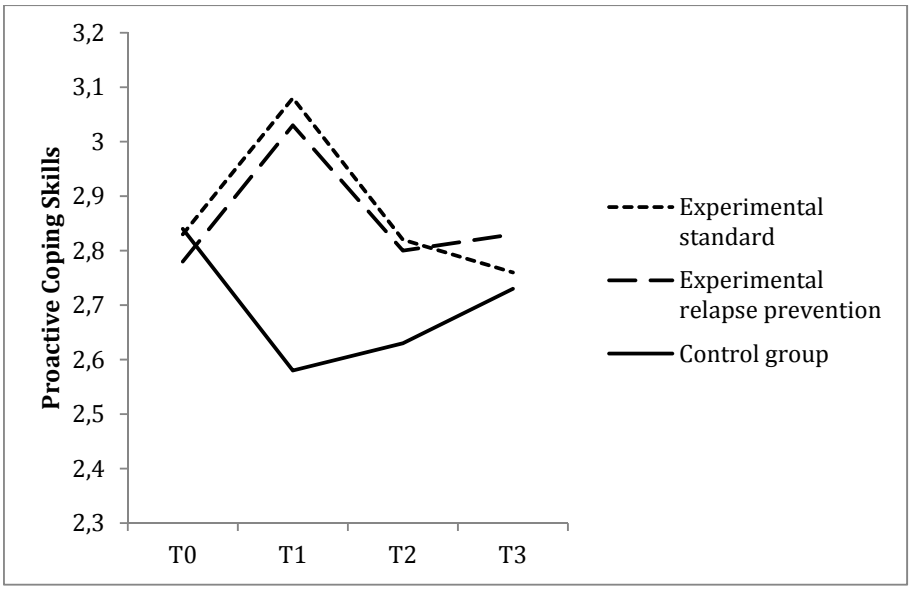


Figure 2. Panel A. Growth Curve Analysis for Proactive Coping Skills.

Self-efficacy. For self-efficacy, the slopes during the initial phase were positive and significant for the experimental groups, β_{SandRP} = .41, but negative during the continuance phase, β_S= -.37 and β_{RP} = -.61, and non-significant during the follow-up phase. Thus, although the experimental groups experienced an initial increase in self-efficacy, this increase was nullified during the continuance phase and remained stable after this. The control condition remained stable throughout all phases.

Goal commitment. Goal commitment remained stable for all conditions during the initial phase. Whereas the standard condition (S-condition) remained stable throughout the subsequent phases, both the relapse prevention (RP-condition) and control condition showed a decrease in goal commitment during the continuance phase, albeit stronger in the control condition, $\beta_{Control}$ = -.74, than in the RP-condition, β_{RP} = -

.48. The control condition remained stable during the follow-up phase, but the slope of the RP-condition was negative, demonstrating even further deterioration in goal commitment, β_{RP} = -.70.

Sense of responsibility. During the initial phase, the S and RP-conditions remained stable, whereas the control condition decreased over time, $\beta_{Control}$ = -.38. Throughout the rest of the phases, all conditions remained stable.

Behavioral measures

Diet and Exercise. A positive slope during the initial phase was obtained for all three groups in diet, β_{SandRP} = 1.04 and $\beta_{Control}$ = .82 (see also Figure 2, Panel B), as well as for exercise, β_{SandRP} = .38 and $\beta_{Control}$ = .49. Regardless of condition, participants did not show further changes during the continuance and follow-up phase, indicating stability.

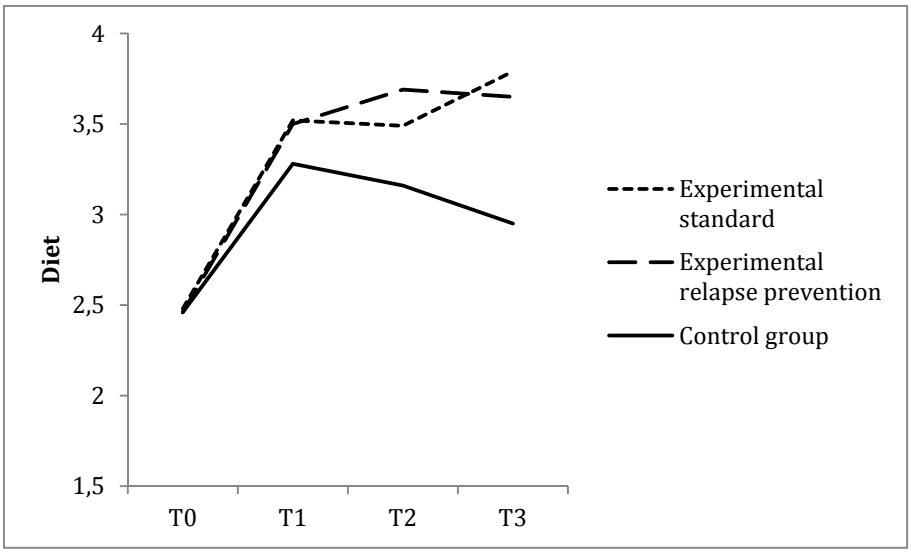


Figure 2. Panel B. Growth Curve Analysis for Diet.

Biomedical measures

BMI. The experimental groups and the control group decreased in self-reported BMI during the initial phase, β_{SandRP} = -.80 and $\beta_{Control}$ = -.72. These results were even stronger for measured BMI, β_{SandRP} = -1.16 and $\beta_{Control}$ = -1.23. During the continuance phase, only the S-condition decreased even further in self-reported BMI, β_S = -.46, whereas the other groups remained stable. In contrast, for measured BMI, both experimental groups decreased, β_S = -.42 and β_{RP} = -.51, whereas the control group

remained stable. During the follow-up phase, the RP-condition self-reported a significant increase in BMI, β_{RP} = .78, whereas S-condition and the control group remained stable (BMI was not measured at T3). See Figure 2, Panels C and D.

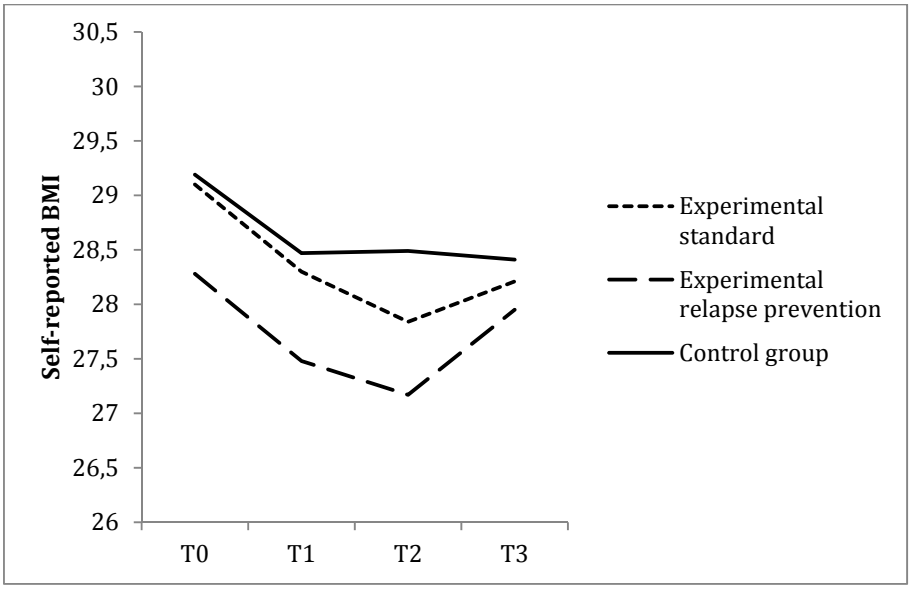


Figure 2. Panel C. Growth Curve Analysis for Self-reported BMI.

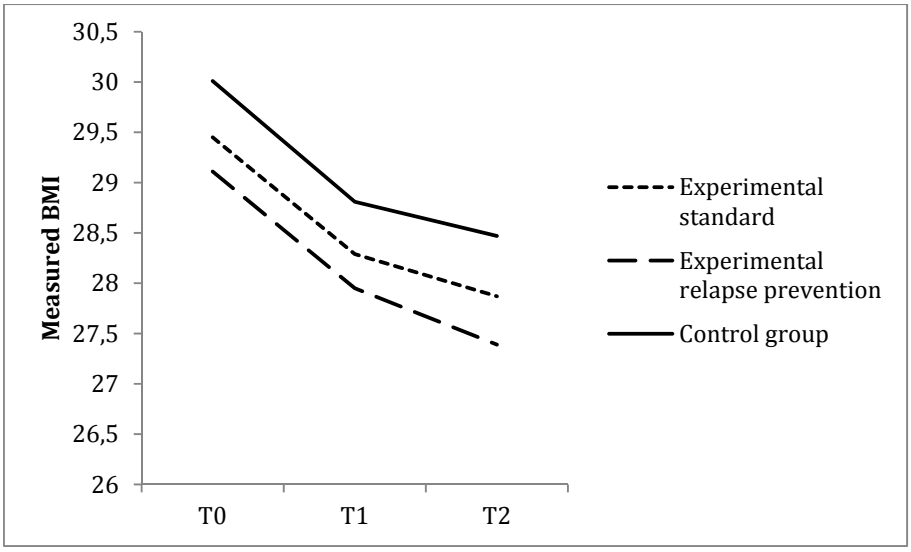


Figure 2. Panel D. Growth Curve Analysis for Measured BMI.

Table 2. *Standardized parameter estimates of growth curves of all outcome variables*

	Experimental standard		Experimental relapse prevention		Control group	
Variable	Parameter estimate	90 % credibility interval	Parameter estimate	90 % credibility interval	Parameter estimate	90 % credibility interval
Proactive Coping						
Intercept	7.63**	6.50 to 9.67	7.63**	6.50 to 9.67	7.63**	6.50 to 9.67
Slope initial	.25*	.01 to .05	.25*	.01 to .05	-.26	-.63 to .04
Slope continuance	-.26	-.73 to .08	-.23	-.74 to .15	.05	-.39 to .61
Slope follow-up	-.06	-.51 to .37	.03	-.46 to .46	.10	-.45 to .69
Self-efficacy						
Intercept	5.96**	4.86 to 8.05	5.96**	4.86 to 8.05	5.96**	4.86 to 8.05
Slope initial	.41**	.16 to .76	.41**	.16 to .76	-.10	-.48 to .20
Slope continuance	-.37*	-.71 to -.03	-.61**	-1.06 to -.25	-.26	-.73 to .19
Slope follow-up	.09	-.39 to .44	-.12	-.51 to .22	-.37	-.99 to .12
Goal commitment						
Intercept	7.19**	6.03 to 9.31	7.19**	6.03 to 9.31	7.19**	6.03 to 9.31
Slope initial	.08	-.17 to .33	.08	-.17 to .33	-.06	-.42 to .29
Slope continuance	-.30	-.71 to .04	-.48*	-.96 to -.11	-.74**	-1.38 to -.30
Slope follow-up	-.26	-.84 to .19	-.70**	-1.55 to -.23	-.06	-.70 to .55

* $p \leq .01$; ** $p \leq .05$.

	Experimental standard		Experimental relapse prevention		Control group	
Variable	Parameter estimate	90 % credibility interval	Parameter estimate	90 % credibility interval	Parameter estimate	90 % credibility interval
Sense of responsibility						
Intercept	11.66**	9.69 to 15.80	11.66**	9.69 to 15.80	11.66**	9.69 to 15.80
Slope initial	.08	-.17 to .33	.08	-.17 to .33	-.38*	-.78 to -.07
Slope continuance	-.03	-.34 to .26	-.04	-.36 to .29	.34	-.01 to .72
Slope follow-up	-.21	-.61 to .14	-.07	-.45 to .39	-.07	-.56 to .32
Diet						
Intercept	7.30**	6.37 to 8.57	7.30**	6.37 to 8.57	7.30**	6.37 to 8.57
Slope initial	1.04**	.67 to 1.68	1.04**	.67 to 1.68	.82**	.47 to 1.35
Slope continuance	-.03	-.38 to .43	.19	-.20 to .81	-.12	-.56 to .34
Slope follow-up	.30	-.08 to .67	-.04	-.43 to .36	-.21	-.74 to .19
Exercise						
Intercept	2.21**	1.84 to 2.78	2.21**	1.84 to 2.78	2.21**	1.84 to 2.78
Slope initial	.38**	.10 to .85	.38**	.10 to .85	.49**	.11 to 1.11
Slope continuance	-.09	-.45 to .24	-.21	-.61 to .18	-.37	-.92 to .05
Slope follow-up	-.02	-.44 to .37	.22	-.21 to .70	.18	-.32 to .72

* $p \leq .01$; ** $p \leq .05$.

	Experimental standard		Experimental relapse prevention		Control group	
Variable	Parameter estimate	90 % credibility interval	Parameter estimate	90 % credibility interval	Parameter estimate	90 % credibility interval
BMI self-reported						
Intercept	15.31**	13.56 to 17.20	15.31**	13.56 to 17.20	15.31**	13.56 to 17.20
Slope initial	-.80**	-1.24 to -.52	-.80**	-1.24 to -.52	-.72**	-1.22 to -.36
Slope continuance	-.46**	-.82 to -.14	-.31	-.67 to .05	.02	-.35 to .41
Slope follow-up	.37	-.12 to .94	.78**	.26 to 1.63	-.08	-.74 to .52
BMI measured						
Intercept	13.75**	12.32 to 15.22	13.75**	12.32 to 15.22	13.75**	12.32 to 15.22
Slope initial	-1.16**	-2.21 to -.74	-1.16**	-2.21 to -.74	-1.23**	-2.48 to -.72
Slope continuance	-.42*	-.90 to -.05	-.51*	-.95 to -.01	-.34	-.83 to .06

* $p \leq .01$; ** $p \leq .05$.

Blood values. A repeated measures ANOVA revealed a significant main effect of time, $F(1, 80) = 4.60$, $p = .04$; indicating that overall Hba1c values worsened over time. This main effect was qualified by a significant time*condition interaction effect, $F(2, 80) = 6.89$, $p = .002$. Simple main effects analyses demonstrated that the S ($M_{ST0} = 38.67$, $SD = 2.94$; $M_{ST3} = 39.26$, $SD = 3.98$;$p = .17$) and RP-condition ($M_{RPT0} = 38.76$, $SD = 2.74$; $M_{RPT3} = 39.07$, $SD = 3.54$; $p = .07$) remained stable. In contrast, in the control condition Hba1c significantly increased over time, $M_{controlT0} = 38.25$ ($SD = 2.69$), $M_{controlT3} = 39.95$ ($SD = 3.72$), $p = .002$. For fasting glucose, tryglicerides, and HDL and LDL cholesterol, there were no significant main effects of time, all p's > .10, nor interaction-effects, all p's > .16.

Discussion

The present study examined the efficacy of a self-management intervention in overweight and obese people at risk for type 2 diabetes. Results demonstrate that for those who completed the intervention, outcomes in behavioral, psychological and anthropometric domains improved in the short term and stabilized over a period of a year. The experimental groups demonstrated greater improvements than the control group on two primary outcomes: proactive coping and measured BMI. Furthermore, it was shown that booster sessions had little added value above the initial phase of intervention, and no straightforward differential effects were found for the two types of booster sessions.

The finding that the experimental groups showed an increase in proactive coping skills during the initial phase, and the control group did not, demonstrates that the intervention succeeded in its primary objective: the development of future-oriented self-regulatory skills. Not only did the experimental groups manage to maintain these proactive coping skills over time, they also continued to lose weight during the continuance phase, whereas the control group did not. The beneficial intervention effects on BMI were also reflected in Hba1c-levels: in the control group Hba1c increased, but it remained stable in the experimental groups. This indicates that the current intervention may help prevent weight gain and stabilize risk for chronic illnesses, which without lifestyle change most often increase over time.

It is important to note that the above results only hold for those who completed the intervention. The fact that more than 20 % of participants did not attend the booster sessions may indicate that people are less willing to adhere to intervention requirements after several months (see also Appel et al., 2011), which mirrors the notion that maintenance of successful weight management, rather than its initiation, is the most pressing challenge that research on obesity treatment faces today (Jeffery et al., 2000). Nonetheless, the rate of drop out in the current intervention is much higher than in other weight management interventions (e.g., Knowler et al., 2002). One reason for this high drop out may be that we did not implement a run-in period before randomization in which availability and attendance confirmation is assessed (Appel et al., 2011; Ulmer, Robinaugh, Friedberg, Lipsitz, & Nastarajan, 2008). Also, the skills-based nature of the intervention may have played a role, as this approach yields benefits through systematic but small changes in eating behavior, which may be incompatible

with the often desired fast and large weight loss among overweight and obese populations. Overall, the low attendance rates suggest that future research should attempt to identify strategies that increase session attendance, especially during later phases of the intervention. It should be noted that at follow-up, the control group lost the most participants, which may indicate that without regular face-to-face contact over an extended period of time, people are more likely to withdraw from intervention. This suggestion should be addressed in future research.

Although the experimental groups improved more than the control groups in two primary outcomes, proactive coping and BMI, for the third primary outcome, eating behavior, a similar pattern emerged for the control group as for the experimental groups. Also, few differences emerged between the control and intervention groups during the initial phase of the intervention. These findings stand in contrast to earlier work (Thoolen et al., 2009) which demonstrated the intervention's short-term advantage over a control group in diabetes patients. One explanation for the lack of differences in diet is that our measure only captured fat intake, which excluded other aspects of achieving a healthy diet that may have yielded a difference between conditions. Also, results may be partly due to the strict control group we employed. Specifically, the assignments that the control group received may have spurred on knowledge about and active use of self-regulatory principles, e.g., goal-setting and self-monitoring. Alternatively, the findings suggest that, at least for non-diabetes patients, nutrition education, written assignments, and attention might be sufficient to trigger some beneficial effects with regard to behavior change. Further research is warranted into the mechanisms that have driven the positive outcomes of the control group.

In addition to examining the intervention's efficacy, we also investigated the added value of booster sessions. Although participants did seem to benefit from attending booster sessions in some respects (e.g., decreased BMI), in general, the booster sessions had little added value beyond the initial phase, and more strikingly, beyond boosters in the form of written assignments (i.e., the control group). This suggests that the initial phase of the intervention may be sufficient to establish both successful initiation and maintenance, especially as Thoolen and colleagues (2009) showed that the intervention without booster sessions yielded similar maintenance effects. Notably, a large proportion of the participants failed to attend booster sessions in the first place; the lack of differences between the "standard" and "relapse

prevention" booster sessions should therefore be interpreted with caution. Nonetheless, the low attendance rates during booster sessions corroborates earlier research indicating that extending interventions by means of face-to-face group sessions may not necessarily yield additional benefits (Kroese et al., 2012).

Several limitations should be noted. First, we analyzed completers only, which may have positively biased the results: it is possible that only those who were able to initiate and maintain improvements over time returned the questionnaires. However, as intention-to-treat analyses with single or multiple imputation methods were unsuitable or impossible, completers-only analyses were deemed the most appropriate for the present research question, i.e., to test the efficacy of the intervention for those who actually attended the intervention. On a related note, relatively small groups were analyzed, which could have resulted in an increased Type I error. However, LGCM counteracted this problem to some extent, as it does not employ listwise deletion when one datapoint for a participant is missing (Duncan & Duncan, 2004). Second, the fact that our population was middle-aged and ethnically homogeneous limits the generalizability of our results. Nonetheless, as middle age is the typical period when diabetes risk becomes manifest our sample was representative in this regard (Villareal, Apovian, Kusher, & Klein, 2005). Third, the reliance on self-reported rather than measured BMI for the final measurement and the lack of a long-term follow-up beyond one year after intervention initiation are important issues that should be addressed in future research.

Notwithstanding these limitations, the present study has several important implications. First, the results indicate that self-management interventions can play an important preventive role in health practice as the intervention improved BMI and proactive coping skills among a sample of overweight, but otherwise healthy adults. Second, the study builds upon cumulative evidence calling the added value of extended interventions for behavior change maintenance into question (e.g., Kroese et al., 2012). Third, the finding that our active control condition and the experimental conditions yielded similar effects in eating behavior and exercise indicates that the efficacy of interventions can be partly explained by effects other than the specific content of the intervention itself (e.g., attention). Overall, this study provides promising results for the efficacy of brief, and thus relatively low-burden, self-management interventions in an overweight/obese population, at least for those who complete it.

Chapter 6:

In it for the long haul:

Characteristics of early and late drop out in a self-management intervention for weight control

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Abstract

Background Although drop out rates in weight management interventions are high, little is known about characteristics of people dropping out at different time points during such interventions.

Purpose This study aims to examine characteristics of early and late drop outs during a self-management intervention aimed at weight control, hypothesizing that changes in psychological characteristics during active intervention would differentiate drop outs from completers.

Methods Participants' (N = 167) socio-demographics and personality traits were measured via self-report at baseline, as well as their behavioral and psychological outcomes before and during the intervention.

Results No baseline differences were found between early drop outs and initial completers. As expected, late drop outs were characterized by a different change pattern in self-efficacy during the initial phase compared to completers. Few differences in other characteristics were found.

Conclusions Changes in self-efficacy during active intervention are relevant for understanding drop out in weight management interventions.

The prevalence of overweight has increased dramatically over the past decades, rendering overweight a true global epidemic (Ogden, Yanovski, Carroll, & Flegal, 2007). As a result, many different weight management interventions have been developed, with varying success (Franz et al., 2007). However, regardless of the type of intervention or its success, large drop out rates are often the rule rather than the exception (Davis & Addis, 1999). To illustrate, drop out rates have been reported of 63 % (Elfhag & Rössner, 2010) and 77.3 % (Inelmen et al., 2005). Despite these high drop out rates, little is known about characteristics that differentiate drop outs from completers at various time points in a weight management intervention. Insight into such characteristics is important to prevent drop out, as an effective weight management intervention has questionable value to the overweight population if only a few people reap its benefits. In the present study, we examined the issue of drop out by differentiating between early and late drop outs in an intervention aimed at self-management of weight control in a sample consisting of overweight and obese adults.

Self-management Interventions

Although self-management interventions may differ in structure and content, they are all characterized by an emphasis on self-reliance and individual responsibility in attaining optimal self-regulation of behavior (Newman, Steed, & Mulligan, 2004). People are encouraged to show active involvement in their behavior change, for example in the context of weight management by choosing personally relevant dietary goals. The primary focus is on training in self-regulation skills and strategies to effectively self-manage eating behavior, such as goal-setting and planning, rather than on adherence to prescriptive guidelines on diet or exercise. Self-management interventions often have a group-based setting, in which people are stimulated to utilize their own and their peers' knowledge to tailor the use of self-regulation strategies to their personal needs and concerns in managing their weight goals (Funnell et al., 2009).

Interventions promoting the self-management of weight-related behaviors provide a promising approach to effective weight-control. The self-management approach has been shown to promote behavioral changes in people who grapple with the self-regulation of their health behavior on a daily basis (e.g., Norris, Engelgau, & Narayan, 2001). Specifically, self-management interventions aimed at weight control have demonstrated beneficial effects in terms of improved dietary habits, exercise levels, and weight loss (Clark, Hampson, Avery, & Simpson, 2004). Moreover, these

improvements have been shown to be sustained up to 9 months after the program (Thoolen, De Ridder, Bensing, Gorter, & Rutten, 2009)[1].

Despite the effectiveness of self-management interventions, it is unclear under which conditions and for whom the self-management approach is appealing and feasible. The present study attempts to provide insight in this matter by elucidating socio-demographic (e.g., sex), trait (e.g., self-control), behavioral (e.g., diet), and psychological (e.g., motivation, self-efficacy) characteristics of the people who complete a typical self-management program compared to those that prematurely terminate it at different time points in the intervention.

Early and Late Drop Out in Weight Management Interventions

Prior studies have attempted to identify characteristics predicting drop out in a wide variety of weight management interventions; drop out has been linked to age, education level, weight loss expectations, prior weight loss attempts, dietary patterns, initial Body Mass Index (BMI; weight in kilograms/(length in meters)^2), and self-efficacy (e.g., Davis & Addis, 1999; Teixeira et al., 2004). However, few characteristics have been found to consistently predict drop out across studies. For example, initial BMI or weight has been found to be positively (Teixeira et al., 2004) and unrelated to drop out (Fabricatore et al., 2009; Honas, Early, Frederickson, & O'Brien, 2003). Similarly, while some studies have found that socio-demographics such as age and education level were negatively related to drop out (Fabricatore et al., 2009), others failed to find such an association (Inelmen et al., 2005). These conflicting results may be explained by the fact that studies vary greatly in method (e.g., behavioral treatment, prescriptive diets), length (e.g., 8-52 weeks), and intensity (e.g., weekly, monthly). Also, the definition of drop out differs widely across studies. For instance, drop out has been defined as non-completion of the last assessment several weeks or months after the treatment had ended (Fabricatore et al., 2009; Teixeira et al., 2004), as the failure to attend a particular amount of consecutive sessions (Wadden, Foster, & Letizia, 1992), and as leaving the program during active treatment (Honas, Early, Frederickson et al., 2003).

Most importantly, however, the vast majority of studies treat people who drop out at different time points during the intervention as a homogeneous group (Elfhag & Rössner, 2010; Inelmen et al., 2005; Teixeira et al., 2004). That is, it has often been assumed that characteristics of drop outs in the early stages of a program, e.g., during the first few weeks, mirror those of drop outs in the later stages of the program, e.g.,

after several months. However, it is likely that characteristics of drop outs differ depending on the timing of drop out (cf. Davis & Addis, 1999), as research has shown that the initiation and maintenance of behavior change are distinct phases that are driven by different motivational and cognitive processes (Rothman, 2000). Moreover, risk factors for drop out may change over time as people encounter different demands of the weight management process (Honas, Early, Frederickson et al., 2003), and as they observe whether their efforts are successfully translated into desired outcomes.

However, to date, few studies have distinguished early from late drop outs (e.g., Benett & Jones, 1986; Honas, Early, Frederickson et al., 2003; Richman, Loughnan, Droulers, Steinbeck, & Caterson, 2001). The two most recent studies that did differentiate between early and late drop out found no differences in baseline characteristics between early drop outs and those who completed the initial phase, except for age (Honas, Early, Frederickson et al., 2003; Richman, Loughnan, Droulers et al., 2001). Although this suggests that early and late drop out exhibit similar characteristics, it is important to note that these two studies almost exclusively examined anthropometric and demographic characteristics as predictors of drop out. This is surprising as ample research has shown that psychological characteristics, such as motivation, self-efficacy and goal commitment, are crucial determinants of success and persistence in weight management attempts (Linde, Rothman, Baldwin, & Jeffery, 2006; Rothman, 2000). Moreover, most research has focused on baseline characteristics in relation to drop out, despite the fact that weight management interventions may inherently (fail to) produce changes which, in turn, may affect whether people are willing and able to continue participation (Bernier & Avard, 1986; Elfhag & Rössner, 2010, Fabricatore et al., 2009). In the present study, we addressed these three gaps in the literature, namely a) the distinction between early and late drop out, b) the assessment of changes in characteristics during active treatment in relation to drop out, and c) the inclusion of theoretically and empirically grounded psychological measures. We use the term "psychological characteristics" throughout this paper to allude to psychological characteristics that are amenable to change over time, whereas we categorize stable personality traits, although psychological in nature, as "trait characteristics".

Psychological Characteristics of Early and Late Drop Outs

Although research has demonstrated the beneficial role of psychological characteristics in engendering successful weight management (cf. Richman, Loughnan, Droulers et al., 2001), studies on the role of these characteristics in relation to drop out from weight management interventions are scarce. The few studies that did assess psychological characteristics in relation to overall drop out, as opposed to early vs. late drop out, have produced mixed results. For instance, whereas some studies found that self-efficacy was related to drop out (e.g., Bernier & Avard, 1986), others did not find this relation (e.g., Teixeira et al., 2004). A plausible explanation for these mixed results is that measures were administered at baseline only. The lack of research on the effect of changes in psychological characteristics on drop out is surprising, because all weight management interventions indirectly involve the improvement or sustainment of psychological precursors to successful weight management (Linde, Rothman, Baldwin et al., 2006).

Rather than being static, self-efficacy, motivation and commitment are dynamic characteristics that may fluctuate over time (Van Zundert, Ferguson, Shiffman, & Engels, 2010), and its (lack of) improvement during the course of an intervention may affect the decision to drop out or continue. Indirect evidence for this notion is provided by Grossi and colleagues (2006), who found that psychological processes during a weight management intervention, such as a lack of motivation or confidence and dissatisfaction with results, play an important role in drop out. Along the same lines, Richman, Loughnan, Droulers and colleagues (2001) found that completers of a weight management program reported significant improvements in their self-efficacy after three months of participation, in contrast to those who dropped out (although the difference was only marginally significant). The notion that (changes in) psychological characteristics during active intervention are associated with drop out, however, has never been empirically tested.

The present study is the first to systematically examine changes in multiple psychological characteristics during a weight management intervention in relation to drop out. As weight management interventions generally attract people who are highly motivated and committed to weight management (Elfhag & Rössner, 2010), likely resulting in ceiling effects and little variance, it is expected that drop outs and those who stay do not differ in psychological characteristics at baseline, regardless of timing of

drop out. However, changes during, and possibly as a result of, the intervention may be associated with drop out later on. For instance, a decrease of one's confidence in successful weight management during the first weeks may lead people to question whether continuing the intervention is useful to them. We therefore expect that drop outs can be differentiated from completers by different change patterns in psychological characteristics during active intervention, rather than baseline characteristics. We chose to include motivation, goal commitment, and efficacy beliefs (confidence and expected difficulties) as our focal psychological characteristics distinguishing drop outs from completers. These characteristics play a pivotal role in the processes of goal setting and goal striving that are central to successful initiation of behavior change (cf. Thoolen, De Ridder, Bensing et al., 2009), and are therefore also likely to play a role in the decision to discontinue intervention. In addition, we measured characteristics previously found to be related to drop out, as well as measures tapping traits relevant to weight management and course evaluations.

Method

Participants

This study was a single-blind, parallel-group, with balanced allocation using simple randomization to two experimental groups and one active control group [1:1:1] randomized controlled trial. Participants were allocated to conditions using the randomization function in Excel, and subsequently assigned by the first author. Eligibility criteria were the absence of diabetes, BMI < 40, current non-involvement in treatment for overweight, and commitment to the goal of improving weight self-management.

Of the 570 people assessed for eligibility, 255 people agreed to participate, of whom 185 people were allocated to the experimental condition (i.e., the intervention aimed at improving the self-management of weight control). In view of the purpose of the present paper, i.e., assessing characteristics of drop outs in a weight management intervention, we only report results for the experimental condition.

In advance, the participants were thoroughly informed about the purpose, methods, and course of the program. No incentive was given for participation. As 9.7 % (N = 18) did not return their baseline questionnaire, the present sample consisted of 167 participants, of whom 77 were men and 90 were women. In the initial phase (see "Procedure"), 123 participants received intended treatment, whereas in the

continuance phase, 83 participants received intended treatment. The average age was 55.86 (*SD* = 5.48), and the average BMI was 29.46 (*SD* = 2.20). Correlations between all baseline variables are depicted in Table 1.

Procedure

The self-management intervention, based on proactive coping theory (Aspinwall & Taylor, 1997; Thoolen, De Ridder, Bensing et al., 2009), consisted of an initial and a continuance phase. The initial phase, week 1-8, entailed one (1-hour) individual session with the group trainer (a trained dietician), and three (2-hour) bi-weekly group sessions (6-8 members). The continuance phase, week 8-24, comprised two (2-hour) booster sessions, which took place 2 months and 4 months after the initial phase had ended. During sessions, the participants were taught self-regulatory skills such as goal-setting and planning (see Thoolen, De Ridder, Bensing et al., 2009, for a detailed description of the effectiveness and the procedure of an intervention study using the same method) aimed at improving dietary habits in particular. The intervention for the two experimental conditions was identical during the initial phase, whereas the booster sessions during the continuance phase differed in content between the two conditions. Measures relevant to the current study aims were employed at baseline (T0) and after the initial phase, i.e., 8 weeks after the start (T1). Questionnaires were sent and returned by mail 2-3 weeks before (T0) and 1-2 weeks after the initial phase (T1), and weight was measured by the trainers during the individual session and after the third group session. The participants were recruited in June 2009. The study took place in community centers in Rotterdam, The Netherlands, from October 2009 to October 2010; data collection pertaining to 1-year follow-up measures was completed in April 2011. Full details of the trial protocol can be found at www.trialregister.nl, trial number 2791, and are available upon request by the first author.

Table 1. *Correlations between all baseline variables*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. Sex – no. (% Male)	-																			
2. Age	-.09	-																		
3. Education level	-.17*	-.16*	-																	
4. Employed – no. (%)	.21**	.40**	-.33**	-																
5. Prior weight loss attempts	-.20**	.08	.05	.01	-															
6. BMI measured	.12	-.11	.007	-.15	-.25**	-														
7. BMI self-reported	.08	-.11	.10	-.18*	-.24**	.93**	-													
8. Diet	.24**	.12	-.10	.16*	-.13	-.13	-.13	-												
9. Exercise	.01	.12	-.05	-.004	.03	-.004	.04	.03	-											
10. Outcome expectancies	.15	-.16*	-.13	-.03	-.22**	.19*	.21**	-.07	.10	-										
11. Expected difficulties weight loss	.16*	-.18*	.08	-.04	-.13	.11	.19*	-.10	-.01	.25**	-									
12. Autonomous motivation	.19*	.09	.07	-.13	-.15	.28**	.35**	.10	.18*	.41**	.03	-								
13. Self-efficacy	-.09	-.04	-.06	-.02	-.08	.05	.04	.32**	.24**	-.09	-.40**	.26**	-							
14. Goal commitment	.17*	-.08	-.01	-.12	-.25**	.27**	.29**	.12	.14	.45**	.02	.61**	.37**	-						
15. Sense of responsibility	.24**	-.05	.04	.05	-.18*	.16*	.18*	.09	-.03	.17*	.14	.34**	.16*	.35**	-					
16. Proactive coping	-.06	-.09	-.16*	-.10	.01	.06	.006	.18*	.15	-.15	-.23**	.11	.53**	.09	.15	-				
17. Self control	-.12	.12	-.07	.04	.07	-.20*	-.18*	.21**	.21**	-.31**	-.28**	-.08	.39**	-.06	-.001	.33**	-			
18. Regulatory focus prevention	.06	-.16*	.04	.05	-.08	.17*	.19*	-.05	-.10	.37**	.21**	.15	-.18*	.16*	.03	-.25**	-.42**	-		
19. Regulatory focus promotion	-.12	-.19*	.35**	-.16*	-.08	.16	.17*	-.02	.10	.25**	.15*	.23**	.07	.24**	.05	.25**	-.14	.53**	-	
20. Future orientation	-.19*	-.05	.25**	-.10	.01	-.06	.03	.05	.12	.09	-.003	.16	.19*	.17	.18*	.26**	.11	.22*	.24**	-

** $p \leq .01$, * $p \leq .05$

Definition of Early and Late Drop Out

We defined drop out based on participants' session attendance in relation to the total amount of group sessions during the initial and continuance phase (three and two group sessions, respectively). The cut-off at 8 weeks was used because the two phases differed in intensity and aims, and were communicated as distinct phases to the participants. The relatively intensive initial phase focused on learning novel skills to facilitate behavior change initiation; in the continuance phase, the frequency of contact was reduced and the emphasis was on maintaining changes.

Early drop out. Of the 167 participants, 123 (73.7 %) attended two or all three group sessions during the initial phase, and were considered "initial completers". The remaining people (*N* = 44, 26.3 %) were considered early drop outs, and consisted of people who failed to show up at the individual session despite returning their baseline questionnaire (*N* = 13), those who dropped out after the individual session (*N* = 16), and those who attended less than two group sessions in the initial phase (*N* = 15).

Late drop out. Among the initial completers (*N* = 123), those who failed to attend any of the booster sessions during the continuance phase were considered late drop outs (*N* = 40, 32.5 %), whereas those who attended at least 1 booster session were considered "continued completers" (*N* = 83, 67.5 %).

Measures

Demographic and anthropometric measures. Demographics included sex, age, education level, and employment status (yes/no). Education level was measured on a 5-point scale; to make these levels in the Dutch school system comparable to other school systems, this variable was converted into three categories: primary education, high/vocational school and higher education. Also, participants reported their height and weight, and were also weighed during the individual session and the last group session by the group trainer, resulting in self-reported weight as well as measured weight. Prior weight loss history was assessed by 1 item, "How often have you tried to lose weight in the past?", with scores ranging from 1 (*never*), 2 (*once*), to 3 (*multiple times*).

Exercise and diet.

Exercise. Exercise was measured by the Physical Activity Scale for the Elderly (PASE), which has been shown to be a reliable and valid measure (Schuit, Schouten, Westerterp, & Saris, 1997). The scale consists of 15 items measuring the amount of days

and time spent per week on various physical activities. A composite score (range 0-800) was computed to form an index of energy expenditure.

Diet. Diet was measured by the Kristal Food Habits Questionnaire (Kristal, Shattuck, & Henry, 1990), which captures dietary modification strategies such as replacing high-fat foods. Participants rated how often they engaged in 20 of such activities (sample item: "How often do you use low-fat products while cooking?"), with scores ranging from 1 (*never*) to 4 (*always*). The reliability of diet was satisfactory at baseline (α T0 = .74) and after 8 weeks, i.e., the initial phase of the intervention (α T1 = .76).

Psychological measures. As noted above, the focal psychological characteristics we examined in relation to drop out were motivation, goal commitment, and efficacy beliefs (confidence and expected difficulties). In addition, we included the measures sense of responsibility, proactive coping, and outcome expectations, as these constructs are typically targeted by self-management interventions (Thoolen, De Ridder, Bensing et al., 2009).

Goal commitment. Goal commitment was measured by 5 items capturing participants' perceived desirability of attaining a healthier weight (sample item: "How important is it to you to achieve a healthier weight?"), with scores ranging from 1 (*not at all*) tot 7 (*very much)*; α T0 = .80; α T1 = .84).

Autonomous motivation. Autonomous motivation was measured by an adapted and abbreviated version of the Treatment Self-Regulation Questionnaire (Williams, Grow, Freedman, Ryan, & Deci, 1996). The 4 statements tapping autonomous motivation were rated on a 5-point scale ranging from 1 (*not at all true*) to 5 (*very true*). Each item started with "The reason I want to achieve a healthier weight is…", followed by, for example, "…because I personally believe it is the best thing for my health" (α T0 = .74; α T1 = .77).

Self-efficacy. Self-efficacy was measured by 6 items tapping participants' confidence in performing the actions necessary for successful self-management of weight and eating behavior, such as seeking social support when difficulties arise (cf. Kuijer & De Ridder, 2003). Each item started with "How confident are you that you are able to…" (sample item: "…adhere to the guidelines for a healthy diet") with scores ranging from 1 (*not at all*) to 7 (*completely*); α T0 = .79; α T1 = .83).

Expected difficulties. Expected difficulties was measured by 1 item, "To what extent do you expect difficulties in losing weight?", with scores ranging from 1 (*none*) to 7 (*many*).

Sense of responsibility. Sense of responsibility assessed the extent to which participants perceived their weight management to be their own responsibility. Participants rated 2 statements (sample item: "I believe it is my responsibility to bring about changes in my lifestyle to achieve a healthier weight") on a 7-point scale, ranging from 1 (*completely disagree*) to 7 (*completely agree*); α T0 = .71; α T1 = .72).

Proactive coping. Proactive coping was measured by the Utrecht Proactive Coping Competence Scale (Bode, Thoolen, & De Ridder, 2008), which assesses individuals' competency in skills associated with proactive coping. The 21 items (sample item: "Making realistic plans") were measured on a 4-point scale, ranging from 1 (*not competent*) tot 4 (*very competent*); α T0 = .83; α T1 = .89.

Outcome expectations. Outcome expectations assessed participants' expected positive outcomes from losing weight in various domains, such as health, self-esteem, and quality of life (sample item: "When I lose weight, then my health will improve"). The scale consisted of 11 items, with scores ranging from 1 (*completely disagree*) to 5 (*completely agree*). This scale was only measured at T0 (α = .89).

Trait measures.

Self control. Self control was measured by the Brief Self Control Scale (Tangney, Baumeister, & Boone, 2004). Participants rated 13 items on a 5-point scale, ranging from 1 (*completely disagree*) to 5 (*completely agree*). An example is "I find it difficult to quit bad habits" (α = .71).

Regulatory focus. Regulatory focus was measured by the Regulatory Focus Scale (Lockwood, Jordan, & Kunda, 2002), assessing prevention and promotion focus. The 18 items were rated on a 5-point scale similar to the Self Control Scale (sample item prevention focus "I frequently think about how I can prevent failures in my life" (α = .81); sample item promotion focus "I typically focus on the success I hope to achieve in the future" (α = .85)).

Future orientation. Future orientation was measured by the Future-subscale of the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999). This 13-item scale measures future orientation, with items ranging from 1 (*not at all*) to 5 (*completely*). An example is "I am able to resist temptations when I know there is work to be done" (α =

.72). The Self Control Scale and Regulatory Focus Scale were measured at T0, whereas the Zimbardo Time Perspective Inventory was measured at T1.

Course evaluation measures.

Group sessions opinion. Group sessions opinion was measured by 4 items (α = .85), and assessed participants' opinion about the group sessions (e.g., useful, interesting).

Course opinion. Course opinion was measured by 6 items (α = .80) and tapped whether participants felt that the course improved their self-management abilities (sample item: "Due to the course, I have a better understanding of how I can manage my weight").

Method opinion. Method opinion tapped participants' opinion about the method. The scale consisted of 3 items (sample item: "I found the five-step plan useful"; α = .94). All three scales were rated on a 5-point scale, ranging from 1 (*not at all*) to 5 (*very much*).

Strategy of Analysis

Differences between early drop outs and initial completers were examined on characteristics measured at baseline (T0; see Table 2). In contrast, differences between late drop outs and continued completers were examined on characteristics measured at baseline (T0) and after the initial phase (T1), as well as on change scores during the initial phase, as calculated by subtracting T0 scores from T1 scores (Δ T0-T1; see Table 2). To test these differences, we conducted multiple analyses of variance (ANOVAs), or Chi-square tests for dichotomous measures. Missing values were handled by listwise deletion.

Results

Early Drop Out[2]

As shown in Table 2, no significant differences emerged between early drop outs and initial completers in baseline socio-demographic, anthropometric, behavioral, trait and psychological characteristics (all *p*'s ≥ .09).

Table 2. *Baseline differences between early drop outs and initial completers.*

	Early drop outs	Initial completers
	M (SD)	M (SD)
N	44	123
Demographic and anthropometric characteristics		
Sex – no. (% Male)	19 (43.2 %)	58 (55.9 %)
Age	55.55 (4.95)	55.97 (5.67)
Education level[a]	6.8 % (1); 61.4 % (2); 31.8 % (3)	1.6 % (1); 65.9 % (2); 32.5 % (3)
Employed – no. (%)	27 (61.4 %)	85 (69.1 %)
Prior weight loss attempts	20.5 % (0); 18.2 % (1); 61.4 % (>1)	15.4 % (0); 15.4 % (1); 69.1 % (>1)
BMI self-reported	28.48 (2.46)	29.12 (1.97)
BMI measured	29.37 (2.80)	29.48 (2.02)
Behavioral characteristics		
Diet	2.59 (.41)	2.48 (.35)
Exercise (PASE)	134.95 (66.54)	130.85 (65.30)
Psychological characteristics		
Outcome expectancies	3.23 (.87)	3.47 (.79)†
Expected difficulties weight loss	4.60 (1.40)	4.31 (1.36)
Autonomous motivation	4.03 (.70)	4.09 (.60)
Self-efficacy	4.67 (1.02)	4.62 (.93)
Goal commitment	5.10 (1.22)	5.33 (.80)
Sense of responsibility	6.41 (.63)	6.46 (.61)
Proactive coping	2.90 (.46)	2.79 (.39)
Trait measures		
Self control	3.38 (.58)	3.38 (.50)
Regulatory focus prevention	1.92 (.79)	1.97 (.68)
Regulatory focus promotion	2.39 (.95)	2.28 (.74)

** $p \leq .01$, * $p \leq .05$, † $p \leq .10$

[a] 1 = primary education; 2 = high/vocational school; 3 = higher education

Late Drop Out

T0 measures. No differences between late drop outs and continued completers emerged in baseline socio-demographic, anthropometric, behavioral and trait characteristics (all *p*'s ≥ .09), except for sex (see Table 3). The late drop out-group consisted of a smaller percentage of males relative to females than the continued completers-group, $p = .01$.

T1 measures. Continued completers had a more positive opinion about the group sessions, $F(1,115) = 29.12$, $p = .00$, $p\eta^2 = .15$, the course, $F(1,115) = 19.63$, $p = .00$, $p\eta^2 = .20$), and the five-step plan, $F(1,114) = 7.92$, $p = .01$, $p\eta^2 = .07$ than late dropouts, as well as a stronger future orientation, $F(1,116) = 6.32$, $p = .01$, $p\eta^2 = .05$).

Change T0-T1. Significant differences between continued completers and late drop outs in changes during the initial phase were found in self-efficacy, $F(1,113) = 6.13$, $p = .02$, $p\eta^2 = .05$, and expected difficulties in losing weight, $F(1,113) = 4.67$, $p = .03$, $p\eta^2 = .04$. Late drop outs' (vs. continued completers') expected difficulties of losing weight increased (vs. decreased), whereas their self-efficacy decreased (vs. increased). No other differences were found between late drop outs and initial completers in change scores in anthropometric and psychological characteristics (all *p*'s ≥ .08).

Table 3. *Baseline (T0) differences and T0-T1 changes in late drop outs (LD) and continued completers (CC)*

	T0		Δ T0-T1	
	LD	CC	LD	CC
	M (SD)	M (SD)	M (SD)	M (SD)
N	43	80		
Demographic and anthropometric characteristics				
Sex – no. (% Male)	13 (30.2 %)	45 (56.2 %)**		
Age	56.47 (6.19)	55.70 (5.40)		
Education level[a]	2.3 % (1); 69.8 % (2); 27.9 % (3)	1.2 % (1); 63.8 % (2); 35 % (3)		

** $p \leq .01$, * $p \leq .05$, † $p \leq .10$

[a] 1 = primary education; 2 = high/vocational school; 3 = higher education

	T0		Δ T0-T1	
	LD	CC	LD	CC
	M (SD)	M (SD)	M (SD)	M (SD)
N	43	80		
Employed – no. (%)	28 (65.1 %)	57 (71.2 %)		
BMI measured	29.72 (2.26)	29.36 (1.88)	-.45 (.65)	-.44 (.71)
Weight measured	88.95 (11.08)	90.40 (9.95)	-1.33 (1.95)	-1.36 (2.16)
BMI self-reported	29.25 (2.35)	29.05 (1.74)	-.45 (.91)	-.69 (.85)
Weight self-reported	87.57 (11.43)	89.74 (9.58)	-1.34 (2.61)	-2.17 (2.60)
Psychological characteristics				
Outcome expectancies	3.44 (.92)	3.49 (.71)		
Expected difficulties weight loss	4.14 (1.41)	4.40 (1.34)	.32 (1.34)	-.35* (1.65)
Autonomous motivation	4.09 (.65)	4.10 (.58)	.04 (.38)	.09 (.57)
Self-efficacy	4.62 (.99)	4.62 (.89)	-.16 (1.02)	.33* (.98)
Goal commitment	5.26 (.80)	5.38 (.81)	-.32 (1.06)	.00† (.84)
Sense of responsibility	6.40 (.65)	6.49 (.59)	-.09 (.87)	.01 (.70)
Proactive coping	2.77 (.36)	2.81 (.41)	-.008 (.40)	.09 (.38)
Trait measures				
Self control	3.42 (.47)	3.35 (.52)		
Regulatory focus prevention	1.83 (.64)	2.05† (.70)		
Regulatory focus promotion	2.16 (.67)	2.36 (.77)		
Future orientation[b]	3.01 (.53)	3.28** (.55)		
Opinion about intervention				
Group sessions opinion[b]	3.36 (.73)	3.89** (.53)		
Course opinion[b]	2.54 (.94)	3.48** (.85)		
Method opinion[b]	2.80 (1.03)	3.43** (1.16)		

** $p \leq .01$, * $p \leq .05$, † $p \leq .10$

[b] Measured at T1

Self-efficacy and expected difficulties in late drop out. To assess whether changes in confidence (i.e., self-efficacy and expected difficulties) are a manifestation of changes in characteristics relevant to weight management, rather than being merely a belief, we computed correlations between these psychological characteristics and (changes in) diet and weight. Results show that changes in self-efficacy and expected difficulties during the initial phase were unrelated to changes in measured and self-reported weight. There were, however, significant moderate associations of changes in both self-efficacy and expected difficulties with diet changes, $r = .32$ and $r = -.28$, both p's $< .01$. This suggests that participants' belief regarding their own ability to successfully manage their weight may be a reflection of actual behavior.

Overall drop outs versus completers. Overall drop outs (early and late drop outs) were also compared with overall completers. These analyses yielded the same results as described above pertaining to late drop outs versus continued completers, that is, overall completers and drop outs did not differ in baseline characteristics, all p's $\geq .10$. Regarding T1 measures, overall completers had a more positive opinion ($M = 3.89$, $SD = .53$) than overall drop outs about the group sessions ($M = 3.34$, $SD = .71$), $F(1,121) = 23.87$, $p = .00$, $p\eta^2 = .17$, the course ($M_{\text{completers}} = 3.48$, $SD = .85$; $M_{\text{dropouts}} = 2.55$, $SD = .91$), $F(1,121) = 32.12$, $p = .00$, $p\eta^2 = .21$), and the five-step plan ($M_{\text{completers}} = 3.43$, $SD = 1.16$; $M_{\text{dropouts}} = 2.71$, $SD = 1.00$), $F(1,120) = 11.97$, $p = .01$, $p\eta^2 = .09$, as well as a stronger future orientation ($M_{\text{completers}} = 3.28$, $SD = .55$; $M_{\text{dropouts}} = 3.01$, $SD = .54$), $F(1,123) = 6.96$, $p = .01$, $p\eta^2 = .05$). Lastly, whereas completers showed an increase in self-efficacy, $M = .33$, $SD = .98$, drop outs' self-efficacy decreased, $M = -.17$, $SD = .1.04$, $F(1,120) = 6.87$, $p = .01$, $p\eta^2 = .05$. In contrast to late drop outs vs. continued completers, differences between overall completers and drop outs were marginally significant, $F(1,120) = 3.33$, $p = .07$. No other differences between overall completers and drop outs were found in the other change scores, all p's $\geq .11$.

General Discussion

The present study examined characteristics of people dropping out at different time points in an intervention aimed at improving self-management of weight control. The study yielded two main findings, which were in line with our proposition that characteristics that (a) pertained to *psychological* constructs and (b) were assessed *during active intervention*, rather than baseline measures, would differentiate drop outs from completers. First, drop outs and completers did not differ in socio-demographic

(age, education level) or behavioral characteristics, trait self-control, motivation, or initial BMI, regardless of timing of drop out. Second, late drop outs (vs. continued completers) were characterized by an increase in perceived difficulty of losing weight (vs. decrease), and no change in self-efficacy (vs. increase) during the initial phase of the intervention.

As expected, neither early or late drop outs differed from completers in baseline characteristics. This suggests that there is no socio-demographic, anthropometric, or psychological advantage at the start for people who turned out to be completers, thereby suggesting that the self-management intervention does not initially retain a selective highly motivated group of people who are relatively well under way or better equipped to successfully self-manage their weight. Moreover, we did not find any of the above mentioned potential advantages for completers in the continuance phase of the intervention, which indicates that selective retention on the basis of baseline characteristics is also unlikely over a longer period of time (i.e., months rather than weeks). The self-management intervention therefore has great potential to benefit a diverse and large proportion of the overweight and obese population, and not just the "lucky few" who are particularly qualified for such an approach to begin with. It has to be noted, however, that a certain selection might have taken place during the recruitment phase, resulting in a relatively homogeneous group of relatively highly motivated participants, which is inherent to most weight management interventions.

As expected, late drop outs were characterized by different change patterns in efficacy beliefs (confidence and expected difficulties) during the initial phase than continued completers. These findings align with earlier research demonstrating that self-efficacy is a cornerstone of successful weight management, arguably by both facilitating behavioral persistence in the face of setbacks and enhancing intervention adherence and session attendance (Chao et al., 2000; Linde, Rothman, Baldwin et al., 2006). Additionally, the findings dovetail nicely with current theorizing about health behavior change, which explicates that self-efficacy is the main ingredient in successful behavior initiation (Rothman, 2000). Lastly, results are in line with earlier research (Grossi et al., 2006) suggesting that evaluation of people's psychological processes during active intervention is crucial to understanding later drop out. Surprisingly, no differences in change patterns were observed between drop outs and completers in the other two focal characteristics: motivation and goal commitment. This may indicate that

these characteristics play a minimal role in drop out from weight management interventions; a suggestion that should be further tested by future research.

Overall, these findings may have important implications for developing and directing ways for prevention of drop out in both clinical and research settings. Specifically, by monitoring changes in self-efficacy during active intervention, health professionals and researchers might be able to identify, and direct efforts towards, the people most likely to give up their weight control attempt. Research shows that there is a wide variety of possible self-efficacy-enhancing techniques available, which result, among other things, in heightened motivation, better clinical outcomes and better treatment adherence (Marks, Allegrante, & Lorig, 2005). Although it can be argued that drop out from a weight management intervention does not necessarily equate quitting a behavior change attempt altogether, the fact that prior studies demonstrate that session attendance has predictive value for individuals' chances of successful weight management (e.g., Williamson et al., 2010) suggest otherwise. In addition, we cannot rule out the possibility that participants dropped out because they felt the program was less useful to them, and that reduced self-efficacy was a side-effect of this matter rather than an explanation for drop out. This notion should be tested in further studies.

Several limitations should be noted. First, the small sample size relative to the amount of characteristics prohibited us from performing formal analyses such as logistic regression, so caution is warranted in drawing conclusions about the characteristics' predictive value for drop out. Relatedly, the large amount of ANOVAs could have increased the Type I error. However, we considered it inappropriate to omit variables that have been found theoretically and empirically relevant to (drop out in) weight management. Also, power issues complicated the use of multivariate tests, and adjusting for the number of tests may have resulted in very stringent *p*-values which strongly affect the chances for Type II error (i.e., failing to find an effect that is in fact present). As this is the first study to relate changes in psychological characteristics during active intervention to drop out, we deemed it important to limit the possibility to overlook potentially meaningful changes not included. For these reasons, we believe that this procedure was warranted and suitable for the purpose of the present study. It is important to note that the present study provides a first proof of principle and overview of the plausible psychological characteristics, and changes thereof, that play a role in drop out from weight management; future studies should address the relative

importance of such characteristics. In addition, further research could examine characteristics not included in the present study which may affect drop out, such as the presence of eating disorders or depression.

Second, our classification of early and late drop outs is open to debate. It is important to note however that our pre-defined conceptual classification, using session attendance in separate phases as criteria, was empirically supported[1]. Nonetheless, further research needs to be done to fine-tune and test the classification as posited in the present study. Third, it is uncertain whether the results can be generalized to different populations (e.g., younger people) or other weight management programs. For example, it is important for future research to examine whether the present results also hold for drop out in weight management interventions of longer duration, e.g., 1 year. Although the contradictory results obtained by prior and the present research may suggest that generalizability is elusive, they may merely point out the need for a consistent and clear definition of drop out.

Lastly, we cannot exclude the possibility that changes may have occurred during the two months without intervention contact after the initial phase. For instance, people who failed to maintain improvements without regular contact may have been more likely to attend booster sessions, whereas those who were able to self-regulate their behavior on their own may have deemed further participation unnecessary. Yet, we render this unlikely, as continued completers reported characteristics which are empirically and theoretically indicative of persistence in the long run, such as future orientation, self-efficacy, and a positive opinion about the program. Nonetheless, future research should address this matter.

Notwithstanding these limitations, this study has important strengths. To our knowledge, the current study is the first to measure (changes in) characteristics other than weight during active intervention in relation to drop out. Also, we included psychological characteristics relevant to health behavior change, which reiterate the need for research on drop out to move beyond socio-demographic and anthropometric factors. Lastly, the study raises important issues that need further research attention to advance our understanding of drop out during a weight management program, such as consensus and clarity about the definition of drop out and its further refinement into different types.

Taken together, the present findings indicate that psychological changes during, and possibly as a result of, the intervention may play a crucial role in persisting or giving up during the later stages in the weight management process. The findings thereby underscore the importance of employing intermediate measures during active intervention in providing valuable insight in which characteristics should or can be targeted during the course of an intervention to minimize drop out. We therefore provide a first step to advance knowledge about drop out in weight management interventions beyond stable baseline characteristics. In light of the current obesity epidemic, it seems prudent to focus on whether and how people can be retained in weight management programs, rather than merely focus on whether they are effective. After all, what good is an effective weight management intervention if only a few people can benefit?

Footnotes

[1] As the self-management approach is traditionally aimed at people with chronic conditions, it is important to note that findings reported here are drawn from studies conducted in a sample of people with diabetes. These findings, however, were deemed applicable and relevant to the present (non-diabetic) sample, because the self-management approach itself is not different for diabetics and pre-diabetics, who often require behavioral changes in similar domains.

[2] We conducted several ANOVAs to examine whether the clustering of the three groups within the category "early drop out" could be considered valid (see heading "definition of early and late drop out"). The analyses showed that our categorization was justified, as they revealed no significant differences (all p's $\geq .17$), except for the ratio of unemployed vs. employed participants within the groups ($p = .03$). The group who dropped out after the individual session comprised fewer unemployed people than the other two groups.

Chapter 7:
Summary and General Discussion

The starting point of this dissertation was the proposition that the anticipation of – and preparation for – obstacles in advance would help people prevent self-regulation failure, and ultimately, achieve more success in adhering to their long-term goal (e.g., Aspinwall & Taylor, 1997; Gollwitzer, 1999). Surprisingly few studies to date have examined how the anticipation and preparation for obstacles influence behavior when people want to change their eating behavior. The present dissertation addresses this gap in the literature by presenting a series of experimental studies and an intervention study on this matter, conducted in both student and community samples. In this chapter, we will first provide a summary of findings from the empirical chapters. Then, we will delineate the current dissertation's contribution to the literature, followed by its implications. Finally, limitations as well as suggestions for future research will be discussed.

Summary of findings

Chapter 2 aimed to examine whether positive self-beliefs (self-efficacy and perceived successfulness) partly determine whether the anticipation of future obstacles affects optimistic expectations towards, and actual success in, limiting unhealthy eating behavior. We operationalized the anticipation of obstacles as perceived goal difficulty, which was experimentally manipulated (easy vs. difficult) to investigate its causal effects on (expected) success. In line with our hypothesis, Study 2.1 and 2.2 showed that participants became less optimistic about their success when they perceived the goal to eat less unhealthily as difficult rather than easy, but only when they lacked positive self-beliefs. In contrast, participants with high levels of positive self-beliefs remained optimistic regardless of whether they perceived the goal to diminish unhealthy eating as difficult or easy. However, whereas Study 2.1 showed that expectations translated to behavior in terms of more subjective experienced success during one week, Study 2.2 failed to replicate these findings using a more objective measure of success in limiting unhealthy eating behavior. These findings indicate that the anticipation of obstacles may be detrimental for optimistic expectations towards success in eating behavior among people with relatively few positive self-beliefs. Also, results suggest that more research is needed on this subject, as our research yielded mixed evidence regarding the translation of optimistic expectations into behavior.

In Chapter 3 we examined the most widely used form of preparation for future obstacles, namely implementation intentions (Gollwitzer, 1999). Such specific if-then plans are helpful in eating behavior change (Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011), but as the future is difficult to predict, planned responses may be impossible or unwise to execute when the obstacle is actually encountered. It was therefore tested whether enhancing the flexibility of implementation intentions would be beneficial to successful self-regulation of eating behavior. In two studies, we examined whether and how planning more than one goal-directed response for a tempting situation (e.g., seeing chocolate), referred to as 'making a Plan B', affects self-regulatory behavior. Findings show that participants who made a Plan B ate more chocolate when confronted with temptation, compared to those who made one or no plan (Study 3.2). Moreover, it was demonstrated that making a Plan B interfered with cognitive processes during both plan formation (creation of strong mental if-then links; Study 3.1) and plan enactment (absence of cognitive load; Study 3.2), which are crucial to successful automatic enactment of planned behavior. These results indicate that, despite its intuitive appeal, increased planned flexibility in coping with future obstacles by making a Plan B may come at the cost of successful goal pursuit in the context of eating behavior.

In Chapter 4 we shifted our focus towards investigating the anticipation and preparation for future obstacles, more broadly subsumed under the term proactive coping (Aspinwall & Taylor, 1997) in a sample of overweight and obese people who participated in a weight management intervention. Specifically, we tested whether proactive coping skills, i.e., skills that help people anticipate and prepare for future obstacles before they occur, play a role in determining whether anticipated obstacles per se are beneficial to successful weight management. Findings show that participants with a high level of proactive coping skills at the start of intervention did not gain additional value from anticipating many rather than few obstacles. In contrast, when participants had relatively few proactive coping skills, the number of anticipated obstacles did differentially influence their success in weight management. That is, among participants lacking proactive coping skills, the anticipation of few obstacles led to weight gain, whereas those who anticipated many obstacles managed to maintain their weight over the course of two months. These findings demonstrate that proactive

coping skills are an important determinant of whether the anticipation of obstacles benefits behavior change.

In Chapter 5 we provided the critical test of whether improvement in future-oriented self-regulatory skills associated with proactive coping would be beneficial to successful weight management. We therefore designed and implemented an intervention aimed at the development of proactive coping and compared its effects over the course of one year on three primary measures (diet, proactive coping skills, and weight) compared to a control group. Results show that whereas the intervention group improved in proactive coping skills in the short-term (i.e., after two months) and BMI in the longer term (i.e., after seven months), the control group did not. No differences between groups emerged in diet, as well as in outcomes at the 1-year follow-up measurement. These results indicate that when people complete the intervention, the proactive coping approach can play an important facilitative role in the treatment of obesity.

As there was a large drop out rate during the intervention as described in Chapter 5, in the final empirical chapter, Chapter 6, we aimed to elucidate which characteristics differentiate people who completed the intervention from those who prematurely discontinued. In doing so, this study was the first to not only include relevant psychological characteristics (e.g., motivation and self-efficacy) before and during intervention as potential drop out characteristics, but also to distinguish early and late drop outs. Findings reveal that drop outs, regardless of whether they quitted early or late during intervention, did not differ from completers on any baseline measure, such as sociodemographic (e.g., age), anthropometric (e.g., weight) and behavioral (e.g., diet) characteristics. In contrast, late drop outs, compared to completers, failed to boost their self-efficacy during the first two months of intervention, while at the same time perceived weight management as increasingly difficult. These results demonstrate that psychological changes during, and possibly as a result of, the intervention may play a crucial role in persisting or giving up during the weight management process.

Theoretical contribution

This dissertation provides several novel insights on the role of obstacle anticipation and preparation in eating behavior change. Below, we will discuss these novel insights in light of the unresolved issues as postulated in the introduction (Chapter 1) and their contribution to the existing literature.

To anticipate or not to anticipate…

A first important contribution of our work is that it provides insight in how the mere anticipation of obstacles – without active and deliberate preparation – influences (expectations towards) eating behavior change. Our research reveals that when people lack the skills to identify and deal with future obstacles in advance, i.e., proactive coping skills (Aspinwall & Taylor, 1997), it is beneficial to successful weight management to at least acknowledge that many rather than few future obstacles will ensue (Chapter 4). Arguably, merely expecting *that* obstacles will occur may compensate to a certain extent for the inability to proactively foresee and prepare for specific obstacles, for example by inducing spontaneous preparatory actions. It is noteworthy that findings indicate that ignoring future obstacles is particularly detrimental to successful weight management: people who anticipated that many obstacles would cross their path during behavior change managed to maintain their weight, whereas those who disregarded the presence of future obstacles experienced a striking weight gain of 1.5 kilos in just two months. As this harmful effect did not occur when people were skilled in proactive coping, our research advances the novel insight that proactive coping skills may play a protective role against expecting a relatively obstacle-free road to goal attainment. This is a valuable insight as prior research has shown that people by default frequently fail to foresee that obstacles are both inevitable and frequent (e.g., Polivy & Herman, 2000).

Although the above results suggest that people are better off with at least foreseeing *that* obstacles will occur rather than selectively ignoring or overlooking them, our research shows that there are also downsides. Specifically, when people have doubts about their ability to achieve success in behavior change, the daunting prospect of striving for a difficult goal – presumably rife with obstacles – lowers optimistic expectations (Chapter 2). Put differently, the anticipation of future obstacles and setbacks may discourage people whose confidence in their chances of success is shaky to begin with, thereby increasing the likelihood that they quit before even starting (see

Chapter 6 for similar results). This study aligns with previous research showing that merely dwelling on the obstacles that may accompany goal pursuit may have detrimental effects on people's willingness to engage in goal pursuit (e.g., Oettingen, 1996). We extend this work by showing that it is not always deleterious to consider the potential negative aspects of future goal pursuit: positive self-beliefs such as self-efficacy (Bandura, 2004) may protect against the discouraging influence of the foresight that eating behavior change will be a long and hard struggle.

It is noteworthy that people with proactive coping skills and positive self-beliefs experienced no additional value from the outlook on the obstacles that may derail goal pursuit, because it did not matter whether they anticipated obstacles or not. At first sight, these findings seem to contradict the proposition that anticipating obstacles during goal pursuit is better than ignoring them, as the anticipation of obstacles arguably evokes more optimism and effort mobilization (Zhang & Fishbach, 2010; Brehm & Self, 1989). However, taking a closer look, it would make no sense that people with proactive coping skills fare better when they anticipate many rather than few obstacles: people who are able to proactively foresee and deal with obstacles already recognize the occurrence of future obstacles. In a similar vein, when people have optimistic expectations about their success in eating behavior change from the start, as fueled by their positive self-beliefs, it defies logic if they would even be more optimistic when they anticipate obstacles rather than not. That is, a boost in optimism in the face of obstacles is proposed to be functional to goal striving as it raises effort and self-confidence (Zhang & Fishbach, 2010). Hence, this functional value of increased optimism disappears when people already believe that success is within their reach. It should be noted that the anticipation of obstacles in light of proactive coping skills and positive self-beliefs were examined in separate chapters, with different research contexts and samples. It is therefore necessary for future research to examine the interplay between these two factors in determining the effects of obstacle anticipation on eating behavior change within the same study.

To summarize, our research demonstrates that (deficits in) psychological resources that typically promote successful self-regulation (i.e., proactive coping skills and positive self-beliefs) form an important determinant in how the outlook on potential failure and hardship affects long-term health goal pursuit. Although anticipating obstacles does not necessarily have additional value for people with

proactive coping skills and positive self-beliefs, it can be concluded that they nonetheless are in the most optimal position with regard to merely anticipating obstacles. Specifically, proactive coping skills may help protect people against being hopelessly underprepared for future obstacles and positive self-beliefs against despair in the face of difficult long-term goal pursuit. As such, our research attests to the value of proactive coping skills and positive self-beliefs when it comes to obstacle anticipation during eating behavior change.

Sometimes less is more

Our work also makes an important contribution to the existing knowledge on the most widely used form of preparation for obstacles, i.e., implementation intentions (Gollwitzer, 1999). Extant research has demonstrated the beneficial effects of preparation via planning on eating behavior change (Adriaanse et al., 2011), but there were still some issues surrounding planning that remained unresolved to date. In our research, we addressed the issue that plans can easily go awry when the planned response is impossible to execute *in situ* (e.g., apples are unavailable when planning "If I am tired and feel like eating chocolate, then I will take an apple instead"). Although it makes intuitive sense to make a back-up plan to increase the chance that self-regulation failure is prevented – as it is often better to be safe than to be sorry – findings show that when people prepare for future obstacles by planning more than one coping response, it can actually backfire and facilitate self-regulation failure (Chapter 3). These results align with recent evidence indicating that multiple plans for multiple obstacles are less advantageous to goal pursuit than one (Dalton & Spiller, 2012; Verhoeven, Adriaanse, De Ridder, De Vet, & Fennis, 2013), and we expand on this research by demonstrating that multiple plans for one obstacle also produce no extra benefits compared to one plan. Also, our findings build upon the notion that preparation for obstacles via implementation intentions is not as simple as it looks, as prior research has shown that there are boundary conditions to their effectiveness (e.g., Adriaanse, Van Oosten, De Ridder, & De Wit, 2011; Webb & Sheeran, 2008b).

To summarize, although it is difficult to predict whether preparatory actions in advance yield their intended purpose, it still may be wise to stick to one plan. Having a 'Plan B' at your disposal may seem useful from an intuitive viewpoint, but our research shows that increasing the number of options to cope with an obstacle via multiple plans

increases the likelihood of self-regulation failure. As such, our research provides important practical knowledge that can be put to use to advance the effectiveness of planning interventions in eating behavior change.

The viability of proactive coping in the real world

In addition to studies in a lab setting, we also examined the effects of anticipation and preparation for obstacles, as incorporated into the concept of proactive coping, in a more ecologically valid field setting. Specifically, we investigated whether an intervention aimed at the development of proactive coping skills would be a viable approach to improve eating behavior and weight management in an overweight and obese population. We tested the viability of this approach by implementing a brief and low intensity intervention focused on the improvement of future-oriented self-regulatory skills involved in proactive coping, such as planning and monitoring for obstacles. Findings reveal that the intervention indeed resulted in improved proactive coping skills (Chapter 5), which indicates that proactive coping is amenable to change and comprise skills that can be developed. If proactive coping would be static and trait-like, it would render the viability of this approach questionable. Moreover, results demonstrate that people who completed the intervention showed larger decreases in their BMI in the long-term than the control group, which received nutrition education and regular attention. Results thereby align with prior research demonstrating the efficacy of the proactive coping approach in a population with diabetes (Thoolen, De Ridder, Bensing, & Rutten, 2009), and extend this research by showing its potential in a sample of overweight and obese people at risk for chronic diseases as well.

However, there are two issues that prohibit a firm conclusion about the viability of the proactive coping approach for successful weight management at present. Despite the fact that the intervention group showed more improvement in BMI during the later phase of the intervention, the control group achieved similar results in two of the primary outcome measures, weight and eating behavior, most notably in the first two months of the intervention. Although this supports the notion that people generally are quite successful in initiating behavior change while maintaining improvements are a much bigger challenge (Jeffery et al., 2000), it stands in contrast with earlier work showing the intervention's short-term advantage over a control group in diabetes patients (Thoolen et al., 2009). One factor that may have played a role in this matter is

the fact that we employed a much stricter control group than is typically the case in weight management interventions (Norris et al., 2005). That is, whereas many interventions include a passive control group that receives education material at the start without any further contact (e.g., Appel et al., 2011), our control group was active and was provided with (written and face-to-face) contact with the same frequency as the intervention group. As such, our research makes a valuable contribution to the literature by showing that non-specific intervention effects (e.g., attention) may explain at least a portion of the effects found in previous studies. This explanation, however, may not eliminate doubts about the viability of the proactive coping approach, as its specific ingredients should have yielded benefits over and above non-specific ones. Nonetheless, it is important to reiterate that the intervention group did achieve more improvement in weight compared to the control group later on. This concurs with earlier suggestions that interventions promoting skill development bring about benefits in the long run rather than immediately (De Ridder, Geenen, Kuijer, & Van Middendorp, 2008).

A second issue is that more than half of the sample discontinued participation at some point during intervention (Chapter 5 and 6). Although we have identified some general characteristics of the people dropping out during different stages of the intervention (Chapter 6), there are several other explanations possible. One explanation may be that approaches aimed at the prevention of weight gain rather than the promotion of weight loss may have limited rewarding value. In the current intervention, the focus was on weight gain prevention through its emphasis on offsetting potential obstacles that would otherwise have led to self-regulation failure. Together with the fact that such approaches advocate small rather than drastic changes in eating behavior, this may have disappointed people who hoped to lose large amounts of weight by participating in the intervention. Another explanation is that obese and overweight people may be dismayed by the explicit, direct, and frequent confrontation with the fact that obstacles will impede their success. That is, the explicit focus on the many obstacles that will accompany the road to successful weight management may function as a fear appeal (Witte & Allen, 2000), but rather than evoking positive effects, the threat of future obstacles may have aroused dread and worry (Aspinwall & Taylor, 1997). This may have led people to prematurely discontinue the intervention. As such, the high drop out rate points not only towards the complexity of tackling the current obesity problem,

but also towards the difficulty of developing and implementing approaches that yield advantages for the majority of the obese and overweight population.

To summarize, results indicate that the proactive coping approach has potential value for overweight and obese people at risk for chronic diseases such as diabetes, at least for those who complete the intervention. The issues raised above, however, suggest that the approach may not be suitable or appealing for all people alike.

Implications

Our research has some important implications for the role of anticipating and preparing for failure and difficulties in eating behavior change. This phenomenon has been largely unexplored to date, possibly because researchers believe that an emphasis on the negative sides of behavior change attempts would threaten what is considered crucial to success: optimism. Although our findings show that the anticipation of obstacles during eating behavior change may decrease optimism for some, this does not mean that people are better off ignoring that obstacles will come their way. An optimistic outlook on behavior change may be a necessary condition to get started, but it is by no means sufficient to maintain behavior change over time (e.g., Rothman, 2000). For the maintenance of eating behavior change, it is important for people to remain vigilant on situations that may lure them into old, unwanted behavior (Marlatt & Gordon, 1985). After all, it sometimes only takes one instance of self-regulation failure to make people give up their attempt altogether (also known as the 'what-the-hell-effect'; Polivy & Herman, 1985). Also, it would be unwise to solely rely on the power of optimistic beliefs throughout the entire behavior change process, as they may quickly fade in the face of conflicting evidence and experience (Armor & Taylor, 1998). To illustrate, in our research, one short article about the alleged difficulty of eating behavior change was sufficient to considerably lower optimistic expectations (Chapter 2). Moreover, our research shows that optimistic expectations are not even necessarily self-fulfilling, which also attests to the unreliable nature of optimism. It seems, then, that although it may be useful for people with little confidence in their success to turn a blind eye to potential obstacles at the start of behavior change, ignoring the bad while focusing exclusively on the good is not the key to successful self-regulation. Rather, if people do not only foresee, but also actively prepare for future obstacles, they may have the best chance to achieve successful self-regulation of their eating behavior.

On a broader level, the research in this dissertation highlights that not all people alike benefit from the same approach when it comes to behavior change. This suggests that finding a 'one-size-fits-all'-approach may be an elusive quest, and that effort should be devoted to identifying ways in which individuals can be better matched to certain treatments (Wadden & Brownell, 1991). Obesity is a complex problem that is determined by a wide variety of factors, which means that the obese and overweight population is not nearly as homogeneous as is often assumed. Rather, this population consists of individuals who grapple with different problems and importantly, who may respond in diverging ways to various treatments. As such, our research emphasizes that it is important to develop a way to predict who will respond to different treatments and to increase our understanding of why responses are different.

The value of improving self-regulation in weight management

The findings from the intervention presented in this dissertation also have some broader implications for the value of targeting improvement of self-regulatory skills in weight management interventions. This method has been labeled as 'behavioral treatment' (Wadden & Foster, 2000), 'lifestyle modification' (Flegal, Carroll, Ogden, & Johnson, 2002), and 'behavior change intervention' (Abraham & Michie, 2008). For the purpose of clarity, we use the term 'self-regulation approach', as it in essence comprises teaching people self-regulatory skills to modify their behavior, such as goal-setting, planning and monitoring (Venditti & Kramer, 2010). The intervention tested in the current dissertation is an example of the self-regulation approach: the unique focus was on people's ability to deal with future obstacles (not inherent to the self-regulation approach), but the method used was skill development to improve self-regulation of behavior (inherent to the self-regulation approach). At present, the self-regulation approach is considered the 'golden standard' for effective obesity treatment (Wing, 2003). However, there may be some potential limitations to this approach, on which we elaborate next.

A defining feature of the self-regulation approach is that people are taught to control their eating behavior by learning strategies that require reflection and careful deliberation (Rothman, Sheeran, & Wood, 2009). For example, during our intervention, people had to set realistic goals, identify potential obstacles, make plans, monitor their behavior and evaluate their progress, and not just once, but again and again to ensure

that the use of these strategies eventually became habitual. As such, it can be argued that the self-regulation approach at the stage of habit formation is quite demanding and effortful, which goes against people's typical desire to lose large amounts of weight the fast and easy way. This common desire is nicely illustrated by the popularity of prescriptive diets as a method of weight loss, which rather than demanding extended and continuous cognitive labor to slowly acquire better eating habits, simply spell out when, what and how much should be eaten every day. This is not to say that dieting works, as it does not (Mann, Tomiyama, Westling, Lew, Samuels, & Chatman, 2007), but it does suggest that following a diet seems a relatively easy way to lose weight, and is therefore the preferred method of weight loss for most people. In contrast, the self-regulation approach may seem to involve an awful lot of hard work in light of the relatively small benefits it produces and the long time it takes to get rewarded for all the effort. Even though behavior change via the self-regulation approach can pay off in the end by creating lasting new habits, it may be unappealing to the majority of the obese population, which challenges the notion that the self-regulation approach is the most viable method in obesity treatment.

Some researchers even go as far as claiming that the self-regulation approach is unfeasible and that when it comes to the obesity epidemic, teaching people strategies and skills to improve their self-regulation is definitely not the solution (Lowe, 2003). Admittedly, the plethora of intervention studies in the past decades that have taken on the self-regulation approach have produced disappointing results (e.g., Brownell, 2010). There is evidence that equipping people with self-regulatory strategies during intervention may help them lose weight at first, but once they leave the program, they regain the lost weight with the same speed and magnitude as people who were never taught these strategies (Hensrud, Weinsier, Darnell, & Hunter, 1994). It could be argued that the self-regulation approach may benefit from augmenting the treatment by adding more components, for example by including dietary counseling, increasing the intensity and duration of contact, or teaching more self-regulatory skills (e.g., Perri & Corsica, 2002). However, research suggests that expanding interventions by adding more self-regulation components or contact hours does not yield additional value for successful weight loss and maintenance. Take, for example, the Diabetes Prevention Program (Knowler et al., 2002), often considered one of the most successful interventions endorsing the self-regulation approach in the field of obesity research to date (Wing,

2002). This intervention yielded an average amount of weight loss of 4.5 kilos over a period of three years. In light of the fact that this intervention was extremely intensive, lengthy and complex, this result indicates that improving the effectiveness of the self-regulation approach through treatment expansion is not the solution in response to its disappointing results.

However, to condemn the value of the self-regulation approach on the basis of disappointing results from intervention studies to date may be throwing the baby out with the bathwater. It would be shortsighted to ignore the vast amount of research demonstrating that a wide array of different self-regulation strategies can be successfully employed to change eating behavior such as planning (Gollwitzer, 1999), goal setting (Pearson, 2012), and self-monitoring (Burke, Wang, & Sevick, 2011). Thus, to state that it is impossible for people to improve self-regulation is overly deterministic as well as untrue (e.g., Baumeister & Tierney, 2011). Moreover, although in an ideal world we would not have to work so hard to keep from eating unhealthily, the fact of the matter is that the current obesogenic environment requires self-regulation to keep eating behavior and weight under control. As the environment at large is difficult to modify, it may be better to actively attempt to improve self-regulation than to passively wait for the world to change. It seems then, that obesity is not necessarily a problem that cannot be fixed via the self-regulation approach, but that we have been largely unsuccessful in designing interventions to teach people self-regulatory skills in a way that is both rewarding and effective. This does not only underscore the complexity of eating behavior and weight modification in obese populations, but also highlights the importance of investigating ways to advance the design and implementation of interventions that aim to tackle the obesity problem through improvement of self-regulation. We will return to this point in our suggestions for future research.

Limitations

Although our research has important theoretical and practical implications, several limitations should be noted. A first limitation is that the studies described in this dissertation may have limited generalizability. Our experimental research was conducted in a sample of young, highly educated females with predominantly healthy weight. This sample may not be representative of the target population that is in most need of help with changing their eating behavior, which are obese and overweight

people – both males and females – who are typically older and less educated (Wadden, Brownell, & Foster, 2002). However, it should be noted that this group represents an appropriate population to investigate our research aims in the context of eating behavior, as many young females are concerned about their weight (Wardle, Haase, & Steptoe, 2006). Among people who do not care about their weight or eating behavior, our manipulation of future obstacles (Chapter 2) or planning (Chapter 3) would have likely yielded weak or no effects, rendering it difficult to test our hypotheses. Nonetheless, it is important to replicate findings from our experimental studies using different samples.

In a related vein, the generalizability of findings from our intervention research (Chapter 4 and 5) is limited due to our analysis of participants who completed the intervention only. Consequently, it is possible that our sample was highly selective, consisting for example only of people who were successful in their weight management. However, data imputation to conduct intention-to-treat analyses, in which all randomized participants are included regardless of whether they completed the trial, was deemed unsuitable as there was insufficient information over time to accurately derive missing data points. Moreover, completers-only analyses were most appropriate considering that we aimed to test the efficacy of the proactive coping approach for those who actually attended the intervention. That said, results should be interpreted with caution, and it is essential for further research to test our hypotheses in larger and possibly more heterogeneous samples.

A second limitation is that although we have demonstrated that the mere anticipation of obstacles influences expectations and behavior (Chapter 2 and 4), we did not investigate underlying mechanisms for these effects. As a result, there are still questions regarding the anticipation of obstacles that remain unanswered to date. For example, it is unknown whether the anticipation of obstacles may affect behavior because it lowers unrealistic optimism (Polivy & Herman, 2002), increases productive optimism (Zhang & Fishbach, 2010), or induces spontaneous preparatory actions. Such questions are important to address in future research because insight in the processes that steer self-regulation opens up novel possibilities for intervention and may help people gain more control over their eating behavior. It could be argued that our intervention research suffers from the same limitation: due its inclusion of a variety of self-regulatory skills (e.g., planning, monitoring, evaluation), it is difficult to pinpoint

which of the specific ingredients engendered the outcomes. However, it should be noted that the choice for targeting these skills is strongly anchored in the theoretical framework of Proactive Coping Theory (Aspinwall & Taylor, 1997). In that light, our theory-driven selection of skills that in unison comprise proactive coping is a particularly strong point. In contrast to our research, many interventions aimed at behavior change target a random selection of self-regulatory skills poorly grounded in theory. Prior research demonstrated, however, that having a theoretical basis for the intervention is the strongest predictor of its efficacy, not the number of skills targeted (cf. Michie & Johnston, 2012).

A third limitation is that many of our studies concern short-term effects (one week in Chapter 2 and 3; two months in Chapter 4), which means that these effects may be short-lived and do not persist over time. A final limitation is that our studies solely focused on the side of energy intake (i.e., eating behavior), while neglecting the side of energy expenditure (i.e., physical activity) of weight management. Although we acknowledge that diet and exercise should ideally be both targeted for successful weight control, it has been shown that decreasing unhealthy behavior is generally more difficult than increasing healthy behavior (Adriaanse et al., 2011), especially when the unhealthy behavior is habitual (Webb & Sheeran, 2006). To illustrate, whereas changing exercise behavior requires the initiation of desired responses (e.g., going to the gym twice a week), changing eating behavior requires the termination of undesired and mostly habitual responses (e.g., not eating chocolate cookies). This suggests that our choice to focus on eating behavior may be the most appropriate to increase our understanding of the side of weight management that people struggle with the most. Even though we would not necessarily expect that the anticipation of obstacles would, for instance, have different effects on behavior when people have the goal to increase their activity patterns, it is nonetheless worthwhile to replicate our findings in the domain of physical activity as well.

Future directions

As the current studies are among the first to examine whether the anticipation and preparation for future obstacles is a viable way to help people change their unhealthy eating behavior, the work presented in this dissertation opens up many new and interesting questions for future research.

The observation that foreseeing and preparing for obstacles does not invariably yield beneficial effects does not mean that people do not profit from using future-oriented self-regulation strategies for successful obstacle management during long-term goal pursuit. After all, people continue to be largely inept in dealing with obstacles *in situ*, thus at the moment that they occur, which makes the need for preparation ahead all the more important. Thus, future research should look into other strategies that people can employ in advance to better deal with obstacles when they are encountered. Prospective strategies that are promising in this regard are self-imposed penalties for self-regulation failure (Ariely & Wertenbroch, 2002), or making rewards contingent on success (Trope & Fishbach, 2000). These strategies may be helpful because they increase the stakes that are at play when an obstacle is encountered by making failure extra costly and/or success extra rewarding. An alternative viable strategy may be to regulate the availability of temptation (Wertenbroch, 1998), for example by removing chocolate from the cupboard. In this way, people would prevent the obstacle from occurring and preclude the need to expend self-regulatory effort altogether.

Also, it would be interesting for future research to examine the effects of obstacle anticipation and preparation on behavior during the maintenance stage of behavior change, as it could be argued that findings from most of our studies (Chapters 2-4) pertain to the initiation stage. The initiation and maintenance stages of behavior change are distinct phases in which different psychological processes and demands play a role in steering behavior (Rothman et al., 2009). Specifically, whereas at the start favorable expectations are the main driving force behind behavior, when people are well underway it becomes more important to be sufficiently satisfied with the obtained outcomes to continue what they started (Rothman, 2000). This suggests that the prospect of future obstacles may take on a different meaning, and therefore have different effects on behavior, depending on whether people are trying to initiate or sustain behavior change. In that light, it is possible that once people have successfully initiated behavior change, the outlook on many obstacles may not have the disheartening effect as we have shown in our research. In fact, it has been suggested that foreseeing and preparing for obstacles may be especially beneficial when people have already adopted new behavioral patterns (Gollwitzer, 1999; Marlatt & Gordon, 1985), as they have gained more insight in which obstacles trigger undesired behavior and may be more willing to take preventive measures to protect what they have

achieved so far. Thus, also given that the maintenance of successful eating behavior change is at present the most pressing challenge in the field of obesity (Jeffery et al., 2000), it is important for future research to also examine the influence of anticipating obstacles in later stages of the behavior change process.

Our research also advances new directions for future research regarding ways to maximize the benefits of preparation for future obstacles via implementation intentions. Although making such specific if-then plans have been shown to promote successful self-regulation in eating behavior, there are also some drawbacks that require further attention. One drawback that we have addressed is that plans may foster rigidity in goal-directed behavior by specifying one obstacle and one goal-directed response (Gollwitzer, 2006). This rigidity can be problematic as it is difficult to predict how the future will unfold, such as whether a planned response to cope with obstacles will be effective. Seeing as our studies (Chapter 3) have demonstrated that formulating multiple plans is not a viable solution, it is necessary to find ways in which more flexibility in planning can be created. One possibility that could be explored is to investigate the effects of creating a 'true' back-up plan, such as "If [planned response X] does not work, then I will execute [planned response Y]". More generally speaking, it would be interesting to investigate how the rewarding value of preparation for obstacles via planning can be enhanced. That is, our and others' research (e.g., Verhoeven et al., 2013) indicates that making one plan at a time may be most effective for eating behavior change. However, as one plan merely can address one obstacle and therefore may bring about only a small change in eating behavior, it is likely that people do not see forming one plan as very rewarding or motivating. As active preparation for future obstacles in advance is better than to passively await them (e.g., Baumeister & Tierney, 2011), future research should therefore examine ways in which people can derive inspiration and motivation from using a plan to prevent potential self-regulation failure.

Another suggestion that follows from our research is that more attention should be devoted to the issue of drop out prevention from weight management interventions. An effective intervention, after all, has questionable value if only a few people reap its benefits. A first important step would be to agree on a consistent and clear definition of drop out. At present, definitions of what constitutes a drop out differs widely between studies (e.g., not completing follow-up measures vs. leaving the program during active

treatment), which makes it difficult to gain a thorough understanding of why people drop out across interventions. In addition, our research suggests that we should move beyond stable baseline characteristics to predict drop out, and also assess psychological characteristics both before and during the intervention. An interesting issue in this regard is whether there are universal characteristics of drop outs (e.g., disappointing weight loss results or waning motivation), or whether reasons for drop out should be sought in the specific nature of the intervention such as duration or method. Also, it is worthwhile to further investigate more general strategies that can be employed to minimize drop out. Examples are the implementation of a run-in period before randomization during which availability and attendance confirmation is assessed (Ulmer, Robinaugh, Friedberg, Lipsitz, & Nastarajan, 2008), and the requirement of a financial deposit at the start of treatment which is refunded after completion (Carels et al., 2013).

Finally, as touched upon above, further research is needed to enhance the viability of interventions aimed at improving self-regulation to help obese and overweight people successfully manage their weight. Even in light of disappointing results obtained from the self-regulation approach so far, it has still the most potential given that other approaches (e.g., prescription drugs such as Metformin and Orlistat or dieting) produce even worse results over time (Mann et al., 2007; Wing, 2002). As the obesogenic environment plays such a pivotal role in the steeply rising obesity figures (Jeffery & Utter, 2003), it seems sensible to combine the self-regulation approach with ways to help people directly control their personal food environment. Specifically, Lowe (2003) suggests that interventions should focus on the structure, composition, and portion size of foods, for example by providing meal replacements or a prepared meal plan. However, this does not eliminate the availability and accessibility of unhealthy food in the larger environment, and importantly, it still takes much self-regulatory effort to implement and adhere to these proposed measures. In that light, it would be most promising to explore methods that speak to the automatic processes that are involved in eating behavior (Rothman et al., 2009) to help people regulate their eating behavior in a less effortful way. One potential approach is to train inhibition of automatic approach responses to stimuli (e.g., chocolate) that would typically elicit unwanted behavior (e.g., excessive intake). To illustrate, research in the area of alcohol addiction has shown that the urge to approach an alcoholic beverage can be extinguished through

repeatedly refraining from responding to, for example, a beer picture (Wiers, Eberl, Rinck, Becker, & Lindenmeyer, 2011). Another fruitful approach is to make use of so-called 'nudges' (Thaler & Sunstein, 2008), which entails that the desired behavior (e.g., eating an apple instead of chocolate) is made easy and effortless, thereby constituting the automatic choice. An example is to place apples prominently on a visible spot, while hiding chocolate at the back of the cupboard. Nonetheless, as deliberate processes can still overrule automatic ones and self-regulatory skills remain an important asset in eating behavior change, it seems prudent for future intervention research to investigate ways in which both effortful and effortless self-regulation can be improved together.

Conclusion

Based on the current research it is concluded that the anticipation and preparation for future obstacles during eating behavior change can play an important facilitative role in successfully decreasing unhealthy eating habits. This is a valuable insight as people are remarkably inept in successful self-regulation when directly confronted with the many obstacles that reside in our obesogenic environment and ourselves. Although our research shows that there may be important benefits to anticipating and preparing for obstacles, or more broadly defined as proactive coping, it also shows that it is difficult and may not be equally appealing for all people alike. As research on the subject is still scarce, the studies in this dissertation open up many new and exciting avenues for future research to increase our understanding of how people can effectively deal with obstacles in advance to improve their eating behavior.

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Nederlandse Samenvatting

(Dutch Summary)

Wanneer mensen zich voorgenomen hebben om hun ongezonde eetgedrag te veranderen, bekijken ze de toekomst vaak door een roze bril. Ze denken bijvoorbeeld aan hoe ze over het strand zullen paraderen met hun nieuwe slanke lichaam en fantaseren over de complimenten die hen ten deel zullen vallen. Door deze optimistische blik lijken mensen echter te vergeten dat de weg naar succesvolle gedragsverandering geplaveid is met veel obstakels: onze voedselrijke omgeving zorgt bijvoorbeeld voor talloze gelegenheden om ons tegoed te doen aan lekker maar ongezond eten. Hoewel optimisme een belangrijke drijvende kracht achter gedragsverandering kan zijn, is het betwistbaar of het negeren van toekomstige potentiële obstakels verstandig is. Als obstakels niet worden voorzien zullen immers van tevoren ook geen maatregelen worden genomen om, op het moment suprême, de overweldigende verleiding te kunnen weerstaan om goede voornemens (tijdelijk) op te geven. Door toekomstige obstakels te voorzien en erop voorbereid te zijn is het aannemelijk dat mensen meer kans maken om een terugval in ongezonde eetgewoonten te voorkomen.

Hoewel bovenstaande suggereert dat het (mentaal en daadwerkelijk) voorbereiden op obstakels een succesvolle strategie kan zijn om mensen te helpen hun ongezonde eetgedrag te veranderen, is er tot nu toe nog weinig aandacht aan dit onderwerp besteed binnen het zelfregulatie-onderzoek. In dit proefschrift is daarom onderzocht in hoeverre anticipatie van en voorbereiding op toekomstige obstakels kan bijdragen aan succesvolle zelfregulatie van eetgedrag.

Zelfregulatie van eetgedrag is geen sinecure

Ongezond eetgedrag is moeilijk te veranderen. Het meest zichtbare bewijs hiervoor is de hoge prevalentie van obesitas en overgewicht, die in Nederland nu bijna 50 % is (Centraal Bureau voor de Statistiek, 2012). Hoewel veel mensen proberen om hun eetgedrag te veranderen om af te vallen, mislukken de meeste pogingen en resulteren zelfs in gewichtstoename (Mann, Tomiyama, Westling, Lew, Samuels, & Chatman, 2007; Jeffery et al., 2000). Een belangrijke reden dat pogingen om minder ongezond te eten vaak mislukken is dat mensen het moeilijk vinden om met de obstakels om te gaan die het proces van gedragsverandering karakteriseren. Deze obstakels bevinden zich in onze zogenaamde 'obesogene' omgeving, zoals geïllustreerd door het feit dat ongezond eten vrijwel overal en altijd beschikbaar en toegankelijk is.

Ook kunnen interne obstakels het voornemen om ongezond eetgedrag te verminderen danig op de proef stellen, bijvoorbeeld positieve en negatieve emoties of gewoontes die automatisch eetgedrag uitlokken.

In de afgelopen decennia is veel onderzoek uitgevoerd naar de psychologische processen die het succesvol overwinnen en aanpakken van obstakels zo moeilijk maken. Zo is aangetoond dat als iemand geconfronteerd wordt met een obstakel, bijvoorbeeld wanneer een lekker stuk chocoladecake wordt aangeboden, een zelfregulatie-conflict ontstaat tussen korte-termijn behoeften (eten) en lange-termijn doelen (slank worden). Dit conflict is echter geen eerlijk gevecht tussen twee even sterke opponenten: de voordelen van het eten van de cake zijn onmiddellijk en tastbaar, terwijl de voordelen van het afslaan van de cake zich pas ergens vaag in de toekomst zullen voordoen. Als gevolg worden goede voornemens voor de lange termijn vaak overboord gegooid ten gunste van onmiddellijke bevrediging (Mischel, 1996). Dit impliceert dat wanneer mensen oog in oog staan met een obstakel, rationele lange-termijn overwegingen eigenlijk al per definitie aan de verliezende hand zijn ten opzichte van hedonische korte-termijn verlangens. Met andere woorden, wanneer we een obstakel tegenkomen, is de geest wel gewillig, maar het vlees is zwak.

Een goede voorbereiding is het halve werk?

Het feit dat het succesvol omgaan met obstakels vaak mislukt als mensen er direct mee geconfronteerd worden, heeft bij zelfregulatie-onderzoekers tot het idee geleid dat een actieve voorbereiding op obstakels vóórdat ze plaatsvinden beter is dan een passieve en afwachtende houding (Aspinwall & Taylor, 1997; Baumeister & Tierney, 2011; Myrseth & Fishbach, 2009). Dit idee staat centraal in het theoretisch raamwerk dat ten grondslag ligt aan dit proefschrift: Proactive Coping Theory (Aspinwall & Taylor, 1997). Proactieve coping omvat de pogingen die mensen ondernemen om een probleem te voorkomen of te veranderen voordat het daadwerkelijk plaatsvindt. Specifiek bestaat proactieve coping uit toekomstgerichte zelfregulatievaardigheden, die ruwweg in vijf stadia kunnen worden ingedeeld: 1) het verzamelen van hulpbronnen (steun uit de omgeving zoeken); 2) het herkennen van potentiële obstakels (weten waar de valkuilen zitten) ; 3) het inschatten van obstakels (afwegen van het 'gevaar' dat obstakels kunnen opleveren) ; 4) voorbereidingen treffen om met geïdentificeerde obstakels om te kunnen gaan (bijvoorbeeld het maken van een plan om de verleiding te kunnen

weerstaan); en, nadat het obstakel heeft plaatsgevonden, 5) het gebruiken van feedback om het succes van de voorbereidingen vast te stellen (kijken of het plan heeft gewerkt).

Eerder onderzoek naar de invloed van proactieve coping op het succesvol beheersen van gewicht en eetgedrag suggereert dat voorbereiding op obstakels een gunstige rol kan spelen in succesvolle zelfregulatie. Zo is bijvoorbeeld aangetoond dat het anticiperen van obstakels, een essentieel onderdeel van proactieve coping, zorgt voor meer optimisme (Zhang & Fishbach, 2010) en succes op het gebied van gedragsverandering (Oettingen, 1996) dan wanneer obstakels worden genegeerd. Belangrijker nog, uit een interventie-onderzoek bij type 2 diabetes patiënten met overgewicht en obesitas bleek dat het aanleren van proactieve copingvaardigheden een positief langdurig effect had op gewichtsbeheersing en eetgedrag (Thoolen, De Ridder, Bensing, Gorter, & Rutten, 2009).

Bovenstaande suggereert dat het anticiperen van – en voorbereiden op – obstakels een vruchtbare manier is om mensen te helpen hun ongezonde eetgedrag te veranderen. Onderzoek naar de invloed van zulke proactieve copingvaardigheden op succesvolle zelfregulatie is echter nog te schaars om eenduidige conclusies te kunnen trekken. Het is bijvoorbeeld niet duidelijk of mensen met overgewicht en obesitas zónder diabetes ook in staat en bereid zijn om proactieve copingvaardigheden te ontwikkelen, en belangrijker, of het aanleren van proactieve copingvaardigheden ook voor hen eetgedrag en gewicht positief beïnvloedt. Hoewel mensen met en zonder diabetes met dezelfde uitdagingen worstelen op het gebied van eten en gewicht, is het mogelijk dat het hebben van een chronische ziekte een bepaalde urgentie tot gedragsverandering met zich meebrengt. Dit zou kunnen betekenen dat mensen zonder diabetes minder bereid zijn om potentiële obstakels onder ogen te zien en ze aan te pakken dan mensen met diabetes.

Ook is tot nu toe onderbelicht gebleven of en welke grenzen er zijn aan de positieve effecten van het anticiperen van en voorbereiden op obstakels op (voorspellers van) gedragsverandering. Het is bijvoorbeeld denkbaar dat voor sommige mensen het vooruitzicht op vele obstakels, ofwel een grote kans op mislukking, een demotiverende invloed kan hebben (Clark, Pera, Goldstein, Thebarge, & Guise, 1996; Oettingen, 1996). Daarnaast kan het feit dat mensen niet over een glazen bol beschikken om de toekomst te voorspellen – men weet bijvoorbeeld nooit zeker of en welke obstakels zich wanneer voordoen – problemen met zich meebrengen die een effectieve

voorbereiding in de weg zitten. Een voorbeeld is iemand die een plan maakt om een gezonde snack in plaats van chips te nemen als hij trek krijgt. Dit plan kan pas succesvol uitgevoerd worden als hij zich van tevoren realiseert dat er gezonde snacks beschikbaar moeten zijn op het moment dat hij daadwerkelijk zin krijgt in een tussendoortje. In dit proefschrift zijn deze onbeantwoorde vraagstukken onder de loep genomen.

Doelstellingen

De centrale doelstelling van dit proefschrift was het verkrijgen van inzicht in hoe de anticipatie van en voorbereiding op toekomstige obstakels eetgedrag beïnvloedt. Het uitgangspunt van het theoretisch raamwerk dat de fundering voor dit proefschrift vormde, Proactive Coping Theory (Aspinwall & Taylor, 1997), is dat het anticiperen en voorbereiden op obstakels een belangrijke gunstige rol speelt in succesvolle zelfregulatie van eetgedrag. Deze basisassumptie werd onderzocht in zowel experimentele als veldstudies, bij steekproeven bestaande uit studenten en een representatieve steekproef uit de doelgroep-populatie (m.a.w. mensen met overgewicht en obesitas). In het eerste deel van dit proefschrift (Hoofdstuk 2-3) werden de twee meest belangrijke elementen van proactieve coping onderzocht (anticipatie en preparatie) door middel van experimentele studies in een gecontroleerde lab setting. In het tweede deel van dit proefschrift (Hoofdstuk 4-6) werd onderzocht in hoeverre (het aanleren van) proactieve copingvaardigheden nuttig is voor mensen met overgewicht en obesitas, die deelnamen aan een interventie gericht op gewichtsbeheersing.

Resultaten

In het eerste empirische hoofdstuk, Hoofdstuk 2, lag de centrale focus van onderzoek op één essentieel specifiek element van proactieve coping: het anticiperen van obstakels. Specifiek werd onderzocht in hoeverre positieve zelfovertuigingen (persoonlijke effectiviteit ('self-efficacy') en waargenomen succes) deels bepalen of de anticipatie van obstakels invloed heeft op (verwacht) succes in het beperken van ongezond eetgedrag. In twee experimentele studies werd de ene groep participanten ervan overtuigd dat het beperken van ongezond eetgedrag heel makkelijk is (en dat er dus weinig obstakels zijn), terwijl de andere groep participanten op overtuigende wijze te horen kreeg dat dat juist heel moeilijk is (en dat er dus veel obstakels zijn). Daarna gaven ze aan hoe optimistisch ze waren over hun toekomstige succes én keerden ze na

een week terug om hun daadwerkelijke succes te rapporteren. Zoals verwacht toonden beide studies aan dat participanten met weinig positieve zelfovertuigingen minder optimistisch waren als ze het doel om minder ongezond te eten als moeilijk in plaats van makkelijk waarnamen. Daarentegen waren participanten met veel positieve zelfovertuigingen optimistisch over hun succes ongeacht of ze het doel om minder ongezond te eten als moeilijk of makkelijk beschouwden. Opvallend was dat Studie 2.1 uitwees dat optimistische verwachtingen zich vertaalden in meer daadwerkelijk (subjectief gerapporteerd) succes in het beperken van ongezond eetgedrag in de week na de manipulatie. Dit effect trad echter niet op in Studie 2.2, waarin succes op meer objectieve wijze werd gemeten, namelijk door het dagelijks bijhouden van een snackdagboek. Deze bevindingen suggereren dat het slechts anticiperen van obstakels, zonder tegelijkertijd ook voorbereidingen te treffen, een negatief effect heeft op optimisme over succes in het veranderen van eetgedrag, maar alléén bij mensen die van tevoren al niet overtuigd zijn van hun eigen kunnen.

In Hoofdstuk 3 werd gekeken naar een ander essentieel specifiek element van proactieve coping: de voorbereiding op toekomstige obstakels. De focus lag daarbij op de meest gebruikte strategie bij het voorbereiden op obstakels: concrete als-dan plannen ofwel 'implementatie intenties' (Gollwitzer, 1999). Een voorbeeld van zo'n plan is: "Als ik chocolade zie en ik heb trek (een obstakel), dan eet ik in plaats daarvan een appel! (een copingstrategie)". Het onderzoek was gebaseerd op het idee dat het soms onmogelijk is om een geplande copingstrategie uit te voeren, zoals wanneer geen appel voorhanden is als iemand bovenstaand plan heeft gemaakt. Om te voorkomen dat je in zulke gevallen met lege handen staat, lijkt het intuïtief gunstig om een tweede copingstrategie ('Plan B') achter de hand te hebben door naast het eerste plan (het eten van een appel) ook een tweede plan gereed te hebben (bijvoorbeeld afleiding zoeken). In twee experimentele studies werd dit onderzocht door één groep te vragen twee plannen te maken (Plan B groep), één groep maakte slechts één plan (Plan A groep) en één groep maakte geen plannen (Controlegroep; alleen in Studie 3.2). Uit de onderzoeken bleek dat het maken van een Plan B geen voordelen biedt ten opzichte van slechts één plan. Sterker nog, in Studie 3.2 aten participanten die een Plan B formuleerden zelfs méér chocolade (tegen hun voornemens in) wanneer ze chocolade voor hun neus kregen dan degenen die geen of één plan maakten. Daarnaast werd aangetoond *waarom* een Plan B een ongunstig effect heeft op eetgedrag: doordat het

maken van een tweede plan essentiële cognitieve processen saboteert, zal gepland gedrag niet automatisch uitgevoerd worden en de kans op zelfregulatie-falen groot zijn. Samen tonen deze bevindingen aan dat het inplannen van meer flexibiliteit tijdens de voorbereiding op toekomstige obstakels ten koste gaat van succesvolle zelfregulatie van eetgedrag wanneer het obstakel daadwerkelijk plaatsvindt.

Vanaf Hoofdstuk 4 verlegden we de focus van onderzoek naar de anticipatie van en voorbereiding op obstakels, op breder niveau deel uitmakend van proactieve coping (Aspinwall & Taylor, 1997), in een populatie van mensen met overgewicht en obesitas die deelnamen aan een interventie gericht op gewichtsbeheersing. In Hoofdstuk 4 onderzochten we of de mate waarin mensen over proactieve copingvaardigheden beschikken deels bepaalt of het anticiperen van obstakels een positieve invloed heeft op succesvolle gewichtsbeheersing. Om dit te onderzoeken werd aan het begin van de interventie aan participanten gevraagd in hoeverre ze a) over diverse proactieve copingvaardigheden beschikten, en b) in hoeverre ze obstakels verwachtten tijdens het proces van afvallen. Twee maanden later werd gekeken in hoeverre de participanten waren afgevallen, aangekomen of op gewicht waren gebleven. De resultaten wezen uit dat voor participanten die aan het begin van de interventie over veel proactieve copingvaardigheden beschikten het anticiperen van veel obstakels geen toegevoegde waarde had. Daarentegen was het voor degenen met relatief weinig proactieve copingvaardigheden gunstiger om veel obstakels te verwachten: het anticiperen van weinig obstakels leidde tot gewichtstoename gedurende twee maanden, terwijl degenen die veel obstakels verwachtten erin slaagden om hun gewicht te behouden. Dus, als mensen niet goed in staat zijn om proactief met toekomstige obstakels om te gaan, is het in elk geval beter om te verwachten dat er veel in plaats van weinig obstakels het doel om af te vallen in de weg zullen staan. Deze bevinding suggereert dat proactieve copingvaardigheden een belangrijke beschermende rol spelen tegen de negatieve effecten van een (te) optimistische verwachting over het proces van gedragsverandering.

In het daaropvolgende hoofdstuk, Hoofdstuk 5, werd onderzocht of mensen met overgewicht en obesitas in staat zijn om proactieve copingvaardigheden te ontwikkelen én of dat resulteert in een gezonder eetpatroon en gewicht. Daartoe nam één groep participanten deel aan een cursus die gericht was op de ontwikkeling van proactieve copingvaardigheden (de interventiegroep), die werd vergeleken met een groep die

slechts informatie over gezond eten kreeg en met wie regelmatig contact werd onderhouden (de controlegroep). Op verschillende tijdspunten gedurende een jaar (na twee, zeven en twaalf maanden) werden de drie primaire uitkomsten van de interventie gemeten en vergeleken: het eetpatroon, de proactieve copingvaardigheden en het gewicht. De resultaten toonden aan dat de interventiegroep na twee maanden meer proactieve copingvaardigheden had ontwikkeld (en de controlegroep niet), en na zeven maanden meer waren afgevallen dan de controlegroep. Er waren echter noch verschillen tussen de groepen in het eetpatroon op alle tijdspunten, noch in de uitkomsten na een jaar. Gezien we alleen de interventie-participanten hebben geanalyseerd die daadwerkelijk van begin tot eind aan de interventie hebben deelgenomen, suggereren deze resultaten dat wanneer mensen de interventie afmaken, de 'proactieve coping-aanpak' een positieve rol kan spelen in de behandeling van overgewicht en obesitas.

Naast de vraag of mensen *in staat* zijn om proactieve copingvaardigheden te ontwikkelen, zoals behandeld in Hoofdstuk 5, was ook een belangrijk onbeantwoord vraagstuk of mensen *bereid* zijn om proactieve vaardigheden aan te leren om beter met hun gewicht en eetpatroon om te gaan. Met andere woorden, is de 'proactieve coping-aanpak' een methode die aantrekkelijk is voor in elk geval een deel van de populatie met overgewicht en obesitas, en zo ja, voor wie? Om deze vraag te beantwoorden, werd in het laatste empirische hoofdstuk (Hoofdstuk 6) onderzocht door welke kenmerken participanten die de interventie in zijn geheel doorliepen ('voltooiers') zich onderscheidden van degenen die hun deelname voortijdig beëindigden ('afhakers'). Dit deden we door deze groepen met elkaar te vergelijken op relevante psychologische kenmerken (bijvoorbeeld motivatie) op verschillende tijdspunten (voor en tijdens de interventie). Ook maakten we, om een zo volledig mogelijk beeld te krijgen, onderscheid tussen kenmerken van vroege en late afhakers en vergeleken die met die van de voltooiers. Uit deze vergelijkingen kwam naar voren dat afhakers, ongeacht of ze vroeg (na twee maanden) of laat (na zeven maanden) hun deelname staakten, op geen enkel kenmerk verschilden van de voltooiers zoals gemeten aan het begin van de interventie (bijvoorbeeld leeftijd, gewicht, eetpatroon). Late afhakers verschilden wel van voltooiers op kenmerken die *tijdens* de interventie waren gemeten. Specifiek bleek dat late afhakers, vergeleken met voltooiers, geen stijging in hun persoonlijke effectiviteit ondergingen tijdens de eerste twee maanden en tegelijkertijd gewichtsbeheersing als

steeds moeilijker ervoeren. Deze bevindingen demonstreren dat veranderingen in psychologische kenmerken tijdens, en mogelijk als gevolg van, de interventie een essentiële rol spelen in het volhouden of opgeven tijdens het proces van afvallen.

Conclusie

Samen tonen de onderzoeken in dit proefschrift aan dat het voorzien van en voorbereiden op toekomstige obstakels een positieve invloed kan hebben op het beteugelen van ongezond eetgedrag. Dit nieuwe inzicht is belangrijk omdat de meeste mensen opvallend slecht zijn in het reguleren van hun eetgedrag als ze direct met een obstakel worden geconfronteerd. Vaak is de verleiding te groot om tóch het lekkere koekje te nemen als we er oog in oog mee staan en het koekje kunnen voelen, ruiken en zelfs al bijna proeven. Daarom is het verstandig om van tevoren, als we niet al onze energie hoeven te besteden aan het weerstaan van de tastbare en onmiddellijke verleiding, na te denken over dit soort obstakels en alvast een plan gereed te hebben. Wie niet sterk is, moet tenslotte slim zijn. Hoewel het onderzoek beschreven in dit proefschrift aantoont dat de (mentale en daadwerkelijke) voorbereiding op obstakels, ook wel 'proactieve coping' genoemd, belangrijke voordelen kan hebben, is ook gebleken dat deze aanpak moeilijk en wellicht niet aantrekkelijk of geschikt is voor alle mensen. Gezien onderzoek naar dit onderwerp nog schaars is, geven de inzichten in dit proefschrift aanleiding tot verder onderzoek naar effectieve manieren om zelfregulatie-falen door directe confrontatie met obstakels te voorkomen. Immers, als we de stijgende obesitas-epidemie willen terugdringen, is het belangrijk om beter te begrijpen hoe mensen beter kunnen omgaan met de vele obstakels die onvermijdelijk zijn tijdens het streven naar een gezonder eetpatroon en gewicht.

Dankwoord
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Dankwoord

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Charlotte Vinkers,
Utrecht, december 2013

Curriculum Vitae

Charlotte Vinkers was born on August 31, 1984 in Wageningen, The Netherlands. In 2002, she graduated from high school at the Christelijk College Zeist in Zeist. After a quick detour to studying Social Work (Sociaal Pedagogische Hulpverlening) at the Hogeschool van Amsterdam, she took yet another, somewhat longer, detour to studying Clinical Psychology at the University of Amsterdam in 2003. After obtaining her Bachelor's degree, she realized that it is non-problematic data, and not problematic people, that she likes the most. In 2007, she finally took the main road and cultivated her passion for research by attending the 2-year Research Master Program in Amsterdam, specializing in Social Psychology. After obtaining her Master's degree in 2009 (cum laude), Charlotte started her PhD project under the supervision of Prof. dr. Denise de Ridder and Dr. Marieke Adriaanse at the department of Clinical and Health Psychology at Utrecht University. During this period, she learned – among many other things – that both data and people with problems provide the most fruitful breeding ground for inspiration and challenge during research.

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