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Mental contrasting of a dieting wish improves self-reported health behaviour†

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Mentally contrasting a desired future with present reality standing in its way promotes commitment to feasible goals, whereas mentally indulging in a desired future does not. Dieting students ($N = 134$) reported their most important dieting wish that they deemed attainable within a 2-week period. Then, they were directed to mentally contrast or indulge in thoughts and images about the named dieting wish. A control condition was given no directions. Two weeks after the experiment, dieters retrospectively rated their behaviour change: in the mental contrasting condition they reported having eaten relatively fewer calories overall, fewer high-calorie food and more low-calorie food compared to those in the indulging and control conditions, and they also reported having been more physically active. This transfer effect from one health domain to another suggests a more generalised effect of mental contrasting versus indulging and control than previously assumed.

Keywords: goal commitment; mental contrasting; indulging; dieting; physical exercise

Mental contrasting of a dieting wish improves self-reported health behaviour

‘If I were healthier, I could motivate myself to quit other unhealthy habits. I would feel better about myself, and my general disposition would be happier. My body would see an improvement and that would help me socially’ (female student, 20 year old). This quote from one of the participants in this study is a fine example of a free fantasy of having successfully lost weight. It exemplifies participants’ mental images of the manifold benefits of dieting – of achieving weight loss and a slim body, even improving self-esteem and quality of relationships. Indeed, slim people are ascribed to many positive qualities such as self-control, health, happiness and satisfaction with life, while overweight and obese individuals are ascribed with greed, unhappiness and laziness (Davis et al., 1992). Hence, many men and women diet continuously to lose weight (Eurobarometer, 2006). In her fantasy, the participant

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also expresses her hope of a motivational carry-over effect of successful dieting to improve other unhealthy habits. This article examines to what extent modes of self-regulatory thought can help people form goal commitments to improve their eating habits and it also examines a possible carry-over effect of self-regulatory thought from one area within the health domain to another, specifically, from dieting to exercise.

Mental contrasting versus indulging

Commitment to goals is essential for goal attainment, especially when goals are difficult to achieve (Locke & Latham, 1990). Goal commitment is based on high expectations of success and high incentive value (Atkinson, 1974; Bandura, 1977; Locke & Latham, 1990; Mischel, 1973). However, a desired and feasible future (positive attitude or high incentive value and high perceived control or efficacy expectations; Ajzen, 1991; Bandura, 1997; Oettingen & Gollwitzer, 2001) is necessary but not sufficient to ensure goal commitment. People need to translate these positive attitudes and high-efficacy expectations into binding goal commitments, a process that is facilitated by using the self-regulation strategy of mentally contrasting the positive future with negative reality. That is, mental contrasting of the desired future decides whether high expectations and incentive value foster goal commitment and subsequent goal achievement or not (Oettingen, 2000; Oettingen, Pak, & Schnetter, 2001). Specifically, there are three modes of self-regulatory thought pertaining to the formation of goal commitment: mental contrasting of future and reality, indulging in the future and dwelling on reality.

Processes

In this article, we will focus on the first two aspects. Indulging in a desired future feigns an ideal future that is not constrained by present limitations or factual knowledge and may depict future events irrespective of the likelihood of their attainment (Oettingen & Mayer, 2002; Oettingen & Wadden, 1991; summary by Oettingen & Thorpe, 2006). Thus, indulging in successfully reaching a desired future hides the fact that achieving the goal requires exerting substantial effort, overcoming hardships and resisting temptations. Consequently, indulging does not heighten commitment to effortful achieving the desired future. Instead, strong goal commitment emerges from mentally contrasting a desired and feasible future (i.e., having high expectations of success), when thoughts and images about a desired future are contrasted with obstacles of present reality (Oettingen, 2000; Oettingen et al., 2001).

Thus, mental contrasting is a self-regulatory strategy that translates feasible wishes (i.e., high-efficacy expectations) into goal commitments with subsequent goal achievement, unlike indulging. For example, fantasies pertaining to a feasible dieting wish (e.g., losing 3 pounds of weight) contrasted with reflections on reality that stands in the way of reaching the specified weight loss (e.g., the urge to eat junk food) will create strong commitment to actually lose 3 pounds. The conjoint elaboration connects future and reality and depicts the reality as an obstacle to be overcome. The obstacle then is linked to respective instrumental means (e.g., pass by at the junk food place) helping to reach the specified goal (Kappes, Singmann, & Oettingen, forthcoming; Oettingen, Stephens, Mayer, & Brinkmann, 2010; Oettingen et al., 2001; summary by Oettingen, in press).

Research supports the idea that mental contrasting of feasible wishes heightens cognitive, emotional and motivational indicators of goal commitment. Importantly, it also heightens commitment as operationalised by performance. For example, mental contrasting helped adolescents improve their grades in math (Oettingen, et al., 2001), school children learn a second language (Oettingen, Hönig, & Gollwitzer, 2000), young adults get to know an attractive stranger (Oettingen, 2000), middle-aged health-care providers give better help (Oettingen et al., 2010) and college-aged women act on reducing their cigarette consumption (Oettingen, Mayer, & Thorpe, 2010).

Transfer of mental contrasting effects

Previous experimental studies have shown that mental contrasting creates a commitment to goals in various life domains (e.g., achievement, health and interpersonal relations). However, the studies had participants mentally contrast about a specific wish. Thereafter, participants were asked whether they were committed to realizing that specific wish. From the health literature, we know that motivational changes in one health domain may impact motivational changes in other health domains (Dunn et al., 2006). For example, a study of participants in a weight control program found motivational ‘spill-over’, where exercise-specific motivation transferred to fighting unhealthy eating habits (Blakely, Dunnagan, Haynes, Moore, & Pelican, 2004; Mata et al., 2009). Less is known about the opposite transfer from eating-specific motivation to changes in physical exercise. Thus, this study explores whether there is a reciprocal transfer from changes in eating to changes in physical exercise in relation to mental contrasting and indulging.

Related approaches

The model of fantasy realization emphasises mental contrasting as a mode of self-regulatory thought that heightens goal commitment and subsequent action. However, mental contrasting not only heightens commitment and spurs action, it also fosters spontaneous planning of the way to wish fulfilment (Oettingen et al., 2001; Oettingen, Mayer, Thorpe, Janetzke, & Lorenz, 2005; Oettingen & Stephens, 2009). Such planning may appear as process simulations (Taylor, Pham, Rivkin, & Armor, 1998), or as implementation intentions or if–then planning (Gollwitzer, 1999; Gollwitzer & Sheeran, 2006). Implementation intentions take the form of ‘if situation x occurs, then I will perform goal-directed action y!’. However, planning also can take the form of coping plans (Sniehotta, Schwarzer, Scholz, & Schüz, 2005). Coping plans specify how to overcome barriers hindering the needed action for goal attainment. By identifying potential obstacles and formulating cognitive or behavioural responses, coping plans increase the chance of successful goal attainment. Another type of coping plans can be found in cognitive behavioural therapy (Avia & Kanfer, 1980). Here, cognitive strategy training focuses on visualizing potential situations followed by practicing coping responses in order to maintain goal-directed behaviour. Interestingly, implementation intentions or if–then planning unfold their effects only when commitment is high (Sheeran, Webb, & Gollwitzer, 2005), a prerequisite that is guaranteed by mental contrasting (Oettingen & Gollwitzer, 2010).

To establish strong goal commitment, people have to imagine first the desired and feasible future and then juxtapose the reality that potentially stands in the way of realizing that future. Only after reflecting on the reality in the context of the desired future, the reality is seen as an obstacle (Oettingen et al., 2001, 2005), and then strong goal commitment unfolds. Vividly imagining the potential positive future can be seen as an example of episodic future thought (Szpunar, 2010) that differs from expecting the positive future (Oettingen & Mayer, 2002; Oettingen & Wadden, 1991). Expecting the future may come as efficacy or outcome expectations (Bandura, 1977, 1997). Whereas efficacy expectations refer to being able to perform a specific behaviour, outcome expectations refer to whether the behaviour would lead to the desired outcome. Mental contrasting will lead to strong goal commitment as long as the expectations of being able to realize the desired future (mostly encompassing both efficacy and outcome expectations) are relatively high. In other words, mental contrasting causes expectations to translate into action.

Finally, this work may be discussed in relation to possible selves. They represent individuals' ideas of what they expect to become, what they would like to become, what they are afraid of becoming as well as of what they may have become (Markus & Nurius, 1986). Possible selves are assumed to provide the incentive value of the respective future and to allow people to interpret information about their own person. They may pertain to expectations, goals, wishes, hopes, or fears and thus encompass variables that have different, indeed opposite, effects on action and successful performances (e.g., Oettingen & Mayer, 2002; Oettingen & Wadden, 1991). In addition, research on mental contrasting finds that fantasies about possible future selves will be turned into binding goals when juxtaposed with reflection on the reality, potentially impeding the realization of the possible future self.

The present research

We investigated the impact of mode of self-regulatory thought on self-reported change in eating behaviour. Specifically, we induced student participants to name a desired and feasible future referring to healthy eating (e.g., eating fruits rather than sweets). Participants then had to either elaborate on a positive aspect of the desired future together with a respective obstacle of present reality (e.g., craving for carrot cake; mental contrasting) or only had to mentally elaborate on the desired future (indulging). In a control condition, we did not provide any instructions regarding the desired future. Two weeks later participants reported their changes in eating behaviour. We hypothesised that students, who were interested in eating healthier or losing weight, when mentally contrasting their dieting wish, would report more improvement in their healthy eating than those who indulged or received no instructions. Specifically, we hypothesised that relatively to before, they would report eating less high-calorie foods, and more low-calorie foods as well as fewer calories overall. Furthermore, based on the findings on motivational 'spill-over', we predicted that healthy eating would be closely related to elevated levels of physical activity. Importantly, participants in the mental contrasting condition should exercise more than participants in the indulging and control conditions just as they improved in healthy eating.

Method

Participants

A total of 134 students (123 female) who were enrolled in a large American University and were interested in eating healthier or losing weight participated in the present two-part study. Eight students did not fill out the follow-up form (Part 2; 6%). The remaining 126 participants had a mean age of 19.6 years ($SD = 1.01$), ranging from 18 to 23 years. Participation was voluntary and earned class credit. Participants were randomly assigned to one of three conditions: mental contrasting, indulging, or no instructions control.

Procedure and materials

Part 1

After participants signed the consent form, they read a cover story stating that the questionnaire pertained to how various thoughts and images relate to feelings and wishes. To be able to check for current dieting behaviour, participants completed the restraint scale (Polivy, Herman, & Warsh, 1978), which measures concern for dieting and weight fluctuation (Van Strien, Breteler, & Ouwens, 2002). We focused on the first factor since it provides best information about participants' present dieting behaviour independent of present and previous weight. Thereafter, participants were asked to write down their currently most important and attainable wish regarding a healthy diet:

What is currently your most important wish regarding dieting? Please take a wish that you would very much like to fulfil within the next 2 weeks and that you think you actually could fulfil within the next 2 weeks.

To check on participants' expectations and incentive value of achieving their dieting wish, they were asked 'How likely do you think it is that you will fulfil your dieting wish within the next 2 weeks?' and 'How important is it to you that you will fulfil your dieting wish within the next 2 weeks?' Response scales reached from 1 (*not at all likely/important*) to 7 (*very likely/important*). Thereafter, participants in the mental contrasting condition had to write down one positive aspect associated with their dieting wish being fulfilled (e.g., participants named get fit, feel healthier and fit again in my clothes), and to mentally elaborate on this. We used the following instructions:

Please write down on the line below a positive aspect that you associate with fulfilling your currently most important wish regarding dieting. What would be the most positive thing about fulfilling that wish? Now really think about this positive aspect. *Imagine the relevant events and experiences as vividly as possible! Let your mind go! Do not hesitate to give your fantasies free reign. Take as much time and space as you need to write down what you are thinking. If you need more space to write, please use the back of the page.*

Then, they were to write down one critical personal obstacle that might hinder them from fulfilling their wish (e.g., participants named laziness, time constraint and exam stress), and then mentally elaborate on their personal obstacle:

Sometimes things do not work out as well as we would have liked. What stands in the way of your dieting wish being fulfilled? What is it in you that could prevent your wish from coming true? Think about it and write down your personal obstacle that might hinder you to fulfil your wish. Now really think about this obstacle. *Imagine the relevant events and experiences as vividly as possible! Let your mind go! Do not hesitate to give your*

fantasies free reign. Take as much time and space as you need to write down what you are thinking. If you need more space to write, please use the back of the page.

The indulging group wrote down two positive aspects associated with fulfilling their dieting wish and mentally elaborated on both positive aspects. Participants of both groups could take as much time as they wanted to mentally elaborate on the aspects. Participants in the control group did not receive this part of the questionnaire. Moreover, to ensure that possible variance in behaviour change stem from the different modes of self-regulatory thought rather than from low energy spurred by depressive symptoms, directly following the mode of self-regulatory thought manipulation, all participants filled out Beck's Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996). Finally, they reported gender, age, height and weight.

Content of diet wishes. Content analysis of participants' wishes revealed the following: 43 participants (34%) wanted to lose weight (e.g., 'I want to lose 2–5 lbs', 'Weight less than 125 pounds and stay at that weight'); 51 participants (41%) had the wish to eat healthier (e.g., 'To eat more fruits and vegetables', 'I would like to eat healthier and cut at alcohol'); 13 participants (10%) wanted to eat less (e.g., 'eat slightly less', 'stop eating bread and pasta at nights') and 19 participants (15%) wished to exercise more (e.g., 'exercise at least five times a week' or 'Do consistently more jogging'). There was no difference between conditions, $\chi^2(6, N = 126) = 6.41, p > 0.37$.

For a stringent test of the transfer from dieting to exercise argument, only participants with diet-related wishes qualified. Thus, we excluded those with exercise wishes ($n = 19$; 15% of the original sample). There were no differences between the excluded participants and the remaining participants regarding expectations, incentive value, gender, BMI and restraint dieting concern, $F_s(1, 124) < 1.16, p_s > 0.73$, Levene's test of homogeneity of variance, $F_s(1, 124) < 1.21, p_s > 0.27$. Participants who wanted to exercise more tended to have a lower level of depression ($M = 10.42, SD = 6.19$) than the remaining participants ($M = 14.55, SD = 10.03$), $F(1, 123) = 3.00, p < 0.10$.

Content analyses of the positive aspects of wish fulfilment showed that participants named losing weight ($n = 4$; e.g., 'being able to wear my Diesel jeans again'), looking better ($n = 13$; e.g., 'Shining in my bikini on the beach'), becoming healthier ($n = 20$; e.g., 'healthy mind and body'), feeling more energised ($n = 7$; e.g., 'being energised in the morning'), or increased self-respect or self-confidence ($n = 26$; e.g., 'gaining more confidence'). Four participants elaborated aspects that could not be categorised. There was no difference between conditions, $\chi^2(5, N = 74) = 4.66, p > 0.45$.

Participants were instructed to name a dieting wish that was attainable within the upcoming 2 weeks. Six participants did not comply to these instructions and reported dieting wishes that they rated as low as 1 and 2 regarding the likelihood of fulfilment (on a 7-point scale). Thus, these participants were excluded from the analysis. Thirty-six of the remaining 101 participants were in the mental contrasting condition, 35 participants were in the indulging condition and 30 participants were in the control condition.

Part 2

After 2 weeks, during which the participants had time to act upon their dieting wish and apply the learned mode of self-regulatory thought to their dieting, participants

returned for Part 2 of the study. Participants read: 'please compare how much of the foods and beverages below you have consumed during the last 2 weeks to how often you usually consume them. Please note whether you have consumed *less, as usual, more or never eat or drink* the different foods and beverages'. The food items were divided into three classes: low-calorie foods (0–100 kcal/100 g) using four items: fruits, vegetables, low-fat dairy products and water. Medium-calorie foods (101–200 kcal/100 g) using five items: regular dairy, fish, meat, pasta and eggs. High-calorie foods (201–600 kcal/100 g) using seven items: chips, junk food, sweets and chocolate, bread, ice cream, sugar and butter (Nutrient Data Laboratory, 2011). Because we were interested in change of eating behaviour within the last 2 weeks compared to participants' habitual eating behaviour, the ratings for each food item were coded as follows: less (coded –1), as usual (coded 0), more (coded 1) and never eat or drink (coded as missing). The items of the three food categories were combined, resulting in three indices for mean changes of consumption of low-, medium- and high-calorie foods, respectively. Each index ranged from –1 to 1, with negative values showing a decrease while positive values showing an increase of consumption of the respective foods.

Based on Chernev's (2011) finding that eating healthily may actually increase rather than decrease *overall calorie intake*, we estimated participants' change of overall calorie intake. Specifically, we wanted to understand whether participants who indicated that they had consumed more healthy foods, had just added healthy foods on top of the medium- and high-calorie foods and thus had consumed more rather than fewer overall calories than before the intervention. To estimate change of overall calorie intake, we multiplied change of low-, medium- and high-calorie foods with the respective mean kcal/100 g. Change of low-calorie foods was multiplied by 50 kcal, change of medium-calorie foods by 150 kcal and change of high-calorie foods by 400 kcal (Nutrient Data Laboratory, 2011). The sum of these three measures was taken as the weighted estimate of change in overall calories. Negative values meant participants reported consuming fewer calories, while positive values meant consuming more calories than before the intervention. Note that this weighted estimate of overall calorie intake should not be understood as having a temporal component or as an absolute account of change of the overall calories participants consumed a day or a week. This variable is merely a weighted estimate of participants' subjective change in the overall calorie intake.

Subsequently, participants responded to how much they had engaged in 18 different physical activities such as volleyball, basketball, soccer and football, swimming and water sports, lifting weights, biking, running, walking the stairs, walking, hiking, endurance workout at the fitness centre, skating, yoga, badminton, tennis, gymnastics, dancing and aerobics, during the last 2 weeks compared with how often they usually engage in them (*less, as usual, more and never do*). The same coding was used for exercise behaviour as for eating behaviour.

Results

Descriptive analyses

Table 1 depicts mean levels and correlation coefficients among the variables. There were no differences between conditions for expectations, incentive value, level of depression, BMI and restraint dieting concern, $F_s(2, 98) < 1.91$, $p_s > 0.15$,

Table 1. Correlations, Ms and SDs ($N = 101$).

Variables	M (SD)	1	2	3	4	5	6	7	8	9
1. Low-calorie foods	0.45 (0.37)	–								
2. Medium-calorie foods	-0.09 (0.37)	-0.06	–							
3. High-calorie foods	-0.39 (0.43)	-0.41***	0.22*	–						
4. Overall calorie intake	-148.77 (186.99)	-0.30**	0.50***	0.95***	–					
5. Physical activity	0.22 (0.42)	0.26**	0.003	-0.33***	-0.28**	–				
6. Expectations	4.58 (1.09)	-0.02	0.19	-0.02	0.03	0.11	–			
7. Incentive value	4.92 (1.32)	0.01	-0.25*	-0.15	-0.21*	0.16	0.30**	–		
8. BMI	23.00 (4.24)	0.13	-0.19	-0.26**	-0.28**	0.08	-0.12	0.17	–	
9. Level of depression	14.13 (9.99)	0.04	-0.07	-0.04	-0.05	-0.06	-0.15	0.25*	0.19	–
10. Restraint dieting concern	1.42 (0.71)	0.02	-0.15	-0.13	-0.16	0.26**	-0.05	0.21*	0.44***	0.17

Note: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

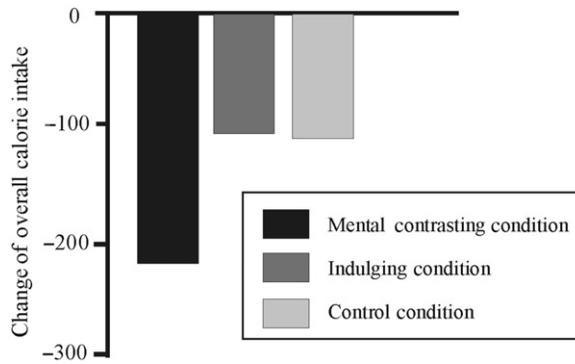


Figure 1. Change in consumption of overall calorie intake.

Levene's test of homogeneity of variance, $F(2, 98) < 1.68$, $p > 0.19$. However, in the mental contrasting condition there were more men (28%) than in the indulging (9%) and control conditions (20%), $F(1, 98) = 2.19$, $p < 0.12$, Levene's test of homogeneity of variance, $F(2, 98) = 10.64$, $p < 0.001$. Because there were more men in the mental contrasting condition than in the indulging and control conditions, the following analyses were controlled for gender.

Weighted estimate of subjective change

To examine the effects of self-regulatory thought on self-reported change in eating, we used a general linear model (GLM) with weighted change in overall calorie intake as the dependent variable, condition as a fixed between subject factor, and gender as covariate. There was no main effect of gender, $F(1, 97) = 0.24$, $p > 0.62$, *partial* $\eta^2 = 0.002$, but a main effect of condition, $F(1, 97) = 4.00$, $p < 0.03$, *partial* $\eta^2 = 0.08$, with participants in the mental contrasting condition reporting to consume fewer calories ($M = -216.71$, $SD = 166.17$) than participants in the indulging ($M = -110.59$, $SD = 181.54$, $t(97) = 2.50$, $p < 0.02$) and the control conditions ($M = -111.77$, $SD = 199.25$, $t(97) = 2.36$, $p = 0.02$) (Figure 1).

Change in consumption of high-calorie foods

An analogous GLM was conducted for change in consumption of high-calorie foods. There was no main effect of gender, $F(1, 97) = 0.05$, $p > 0.82$, *partial* $\eta^2 = 0.001$, but a main effect of condition, $F(2, 97) = 4.61$, $p < 0.02$, *partial* $\eta^2 = 0.09$. Participants in the mental contrasting condition reported consuming fewer high-calorie foods ($M = -0.56$, $SD = 0.33$) than participants in the indulging ($M = -0.30$, $SD = 0.45$; $t(97) = 2.62$, $p = 0.01$) and the control conditions ($M = -0.29$, $SD = 0.47$; $t(97) = 2.60$, $p < 0.02$) (Figure 2, left bar)

Change in consumption of low-calorie foods

There was no main effect of gender, $F(1, 97) = 1.94$, $p > 0.16$, *partial* $\eta^2 = 0.02$, but a main effect of condition, $F(2, 97) = 4.16$, $p < 0.02$, *partial* $\eta^2 = 0.08$. Participants in the mental contrasting condition reported consuming more low-calorie foods

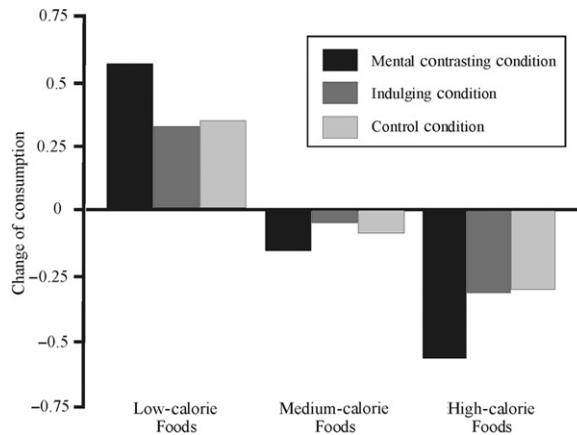


Figure 2. Change in consumption of low-, medium-, and high-calorie foods.

($M=0.57$, $SD=0.32$) than participants in the indulging ($M=0.37$, $SD=0.30$; $t(97)=2.63$, $p=0.01$) and the control conditions ($M=0.38$, $SD=0.45$; $t(97)=2.27$, $p<0.03$) (Figure 2, right bar).

Change in consumption of medium-calorie foods

There was no main effect of gender, $F(1, 97)=1.92$, $p>0.16$, *partial* $\eta^2=0.02$ and no main effect of condition, $F(2, 97)=0.64$, $p>0.52$, *partial* $\eta^2=.01$. All participants consumed slightly less medium-calorie foods (mental contrasting: $M=-0.13$, $SD=0.42$; indulging: $M=-0.06$, $SD=0.35$; control: $M=-0.09$, $SD=0.34$) (Figure 2, middle bar).

Change in physical activity

An analogous GLM was conducted for change in physical activity. Again, there was no main effect for gender, $F(1, 97)=0.73$, $p>0.39$, *partial* $\eta^2=0.007$, but a main effect of condition, $F(2, 97)=3.39$, $p<0.04$, *partial* $\eta^2=0.07$. Participants in the mental contrasting condition reported having exercised more ($M=0.36$, $SD=0.37$) than participants in the indulging condition ($M=0.14$, $SD=0.37$; $t(121)=2.31$, $p<0.03$) and in the control condition ($M=0.14$, $SD=0.49$; $t(121)=2.16$, $p<0.04$) (Figure 3).

Discussion

Mentally contrasting a feasible dieting wish led to self-reported intake of relatively fewer calories overall as well as of high-calorie foods, and at the same time it increased the consumption of low-calorie foods more than indulging or no self-regulatory thought. The results are in line with experimental findings observed across diverse life domains showing that mentally contrasting feasible wishes creates strong goal commitment with subsequent goal striving and goal achievement (Oettingen, 2000; Oettingen et al., 2001, 2009, Oettingen et al., 2010; Oettingen, Mayer, & Brinkmann, 2010). In addition, in comparison with indulging and control

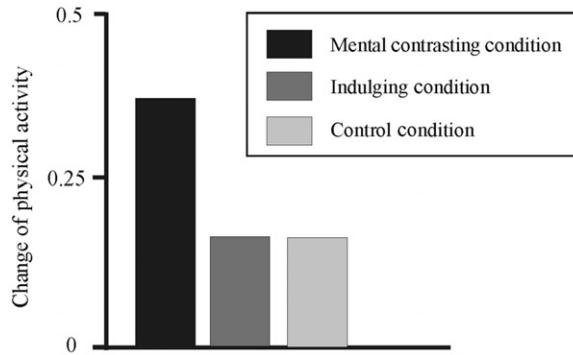


Figure 3. Change in physical activity.

participants, those who had to mentally contrast their dieting wish reported more improvements with regard to their physical exercise.

Research on mental contrasting so far has focused on identifying the mechanisms that make mental contrasting an effective self-regulatory tool for creating goal commitment, goal striving and goal attainment. For example, experiments investigated the effects of mental contrasting on planning the implementation of the specified wish or solving the concern, on feelings of disappointment in the case of failure, on wish-related energisation measured by self-report and physiological responses, on observed effort and finally on actual goal achievement (Oettingen et al., 2001, 2009; Oettingen, Stephens, et al., 2010). These dependent variables directly pertained to the specific wish participants elaborated in their mental contrasting versus indulging mode of thought. Adding to this literature, the present findings suggest that the effects of mental contrasting may transfer to behaviours that go beyond the specified wish (a specific dieting concern) to beneficially affect the intake of low- and high-calorie foods and that they may even transfer to other domains such as physical exercise. However, it remains for future research to investigate which exact processes are responsible for these results.

We measured dieting and exercise behaviour using weighted and unweighted self-report measures, respectively, of participants' perceived improvements compared to their previous eating and exercise habits. Retrospective measures are often used in health related studies, especially regarding food consumption (see e.g., de Vries, Kremers, Smeets, Brug, & Eijmaei, 2008; Luszczynska, Tryburcy, & Schwarzer, 2007; van Osch, Beenackers, Reubsat, Lechner, Candel, & de Vries, 2009). The used measure of perceived change, however, is not as reliable and valid as established instruments. First, people tend to overestimate socially desirable behaviours such as eating healthily and exercising (Adams et al., 2005; Hebert et al., 2008). Second, ratings in retrospect are prone to recall bias and demand characteristics (see e.g., Klesges, Isbell, & Klesges, 1992; Stice, Fisher, & Lowe, 2004), and comparative reports are particularly vulnerable to biases (Chambers & Windschitl, 2004). Still, we have found the predicted differences between the three experimental conditions. Future research may benefit from the use of well-validated self-report measures at the baseline and follow-up and from objectively measured changes in eating and exercise behaviour to support the pattern of results found in this study.

We speculate that such research may indeed support the results of this study. First, in this study, all participants were interested in eating healthier or losing weight and thus wished for behaviour change. Further, social desirability – and demand – effects may have been, if at all, highest for indulging participants. This is because people commonly assume that positive future thinking – rather than negatively reflecting on reality – is socially desirable and a route to successful performance. However, we observed that precisely adding the ingredient of negative reflection (rather than merely indulging in a positive fantasy about the future) benefits successful behaviour change. Therefore, we argue that it is unlikely that the pattern of results between the three experimental groups in the present research is caused by social desirability or demand effects.

Participants who mentally contrasted their dieting wish also reported having improved more in their physical exercise during the 2 week window than those who indulged or did not get the chance to mentally elaborate on their dieting wish. We speculate that participants in both the mental contrasting and indulging conditions learned their respective strategies in the first part of the study and then applied them to other health domains during the 2 weeks following the induction. Although we do not know about the exact processes by which mental contrasting procedures may transfer across domains, we observed that the principles of mental contrasting can be taught in a cost- and time effective way: a brief intervention study targeting the teaching of mental contrasting as a self-regulatory technique in health care professionals observed that in comparison to participants who were taught to indulge in successfully solving everyday life concerns, those who were taught to mentally contrast reported being more successful in managing their time, in setting preferences and in completing as well as delegating projects (Oettingen, Mayer, & Brinkmann, 2010). In line with the present experiment the reported study suggests that the self-regulatory mode of mental contrasting can be easily learned and then effectively applied to more than one specific area within the health domain.

The finding of transfer from diet to exercise behaviour shows that mental contrasting may have a broader impact on behaviour change than previously believed, at least for those who can generate wishful fantasies. However, the present data cannot explain how the transfer exactly came about. It is possible that through learning mental contrasting regarding their dieting wish, participants got more proficient in mentally contrasting other wishes in their everyday life. We speculate that among others procedural priming or mind-set processes may be at work (Bargh & Chartrand, 2000; Gollwitzer, 1990). It is also possible that mentally contrasting their high-expectancy dieting wish caused participants to generate if-then plans (Gollwitzer, 1999) or coping plans of how to overcome their obstacles (Sniehotta et al., 2005), not only regarding their particular dieting wish but also regarding their exercise wishes thus improving the chances of successful behaviour change. In addition, mental contrasting may have energised participants with respect to their particular wish, and this energisation may have reflected on other health related domains (Oettingen et al., 2001, 2009). Finally, the beneficial impact of mental contrasting on physical activity may be due to a motivational ‘spill over’ (Mata et al., 2009) transferring from exercise to eating (Dunn et al., 2006). Future research may test these hypotheses by assessing the mentioned variables as well as other relevant mediator variables in the domain of the wish as well as in related domains. For example, one could assess if-then planning by content analysis as well as feelings of energisation by self-report or systolic blood pressure (Oettingen et al., 2009) in the

dieting as well as the exercise domain. Finally, future research may test whether and if so how indulging and its possible affective and behavioural consequences transfer across domains. However, indulging like the control condition should leave goal commitment relatively unaffected, whether indulging is directly or indirectly related to the respective wish.

Another question for future research is whether the transfer effect of mental contrasting versus indulging and control generalises from the health domain to unrelated life domains such as academic and professional achievement or interpersonal relations. We speculate about the extent that the above-mentioned processes may foster such transfer effects. For example, effectively applying mental contrasting to improve one's diet and exercise might ready an individual to use the self-regulatory tool also to improve studying or to clarify a conflict with a friend. Similarly, mental contrasting, providing high energy to improve diet and exercise, might spur a person to kill two flies with one stone: asking one's friend to join in for the morning run thus creating a new friendship. Finally, motivational spill-over may work through strengthening efficacy beliefs: achieving success in eating healthily and exercising regularly the individual feels he can also achieve his goals in his academic or professional everyday life.

Conclusion

A healthy diet and regular physical exercise are important elements in the promotion and maintenance of good physical and mental health as well as in the prevention of illness. Indeed, unhealthy diets and physical inactivity are two risk factors for raised blood pressure, raised blood glucose, abnormal blood lipids, overweight/obesity and for major chronic diseases such as cardiovascular diseases, cancer, and diabetes as well as for depressive affect (WHO, 2004). Our study suggests that people may use their fantasies about a desired future as a starting point to improve their healthy eating and physical exercise. By mentally contrasting their wishful fantasies about a feasible behavioural change with the present reality that stands in the way of realizing those fantasies, they may enhance their commitment and indeed attain the behaviour change. Returning to the quote in the beginning of this article, the participant in her positive fantasies depicts herself successfully dieting, with a carry-over effect of mastering other unhealthy habits. The present experiment supports the argument that mentally contrasting such positive fantasies with the present obstacles in her path may bring her closer to fulfilling her wish.

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