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Self-regulation of commitment to reduce cigarette consumption: Mental contrasting of future with reality

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The model of fantasy realisation (Oettingen, 2000) specifies mental contrasting of a positive future with negative reality as a strategy that creates strong goal commitments. We propose that fantasies about a positive and negative future produce strong goal commitments when contrasted with the respective reality. The present study supports this hypothesis in the area of reducing cigarette consumption. Mental contrasting of a positive future with negative reality as well as mental contrasting of a negative future with positive reality led to taking immediate action when participants had high expectations of success. Results indicate that both fantasies about a positive future and a negative future can be used to commit to goals that benefit health and prevent disease.

Keywords: smoking reduction; mental contrasting; goal commitment; self-regulation; fantasies; expectations

'I'm more proud of quitting smoking than of anything else I've done in my life, including winning an Oscar'. (Christine Lahti).

The high difficulty of reducing cigarette consumption, as expressed in the quote by Oscar-winning actress Christine Lahti, is mirrored by the wide variety of treatment options available to support people in curbing their addiction (for review, see Dodgen, 2005). Interventions include techniques derived from learning paradigms (e.g. satiation, rapid smoking, contingency contracting), techniques of stress management (e.g. offering cognitive-behavioural elaborations or creating autonomy; Wellman et al., 2005; Williams, Gagne, Ryan, & Deci, 2002) as well as techniques of providing social support (e.g. individual or group counselling). Individualised plans target the smoker's specific lifestyle and stage of smoking cessation (DiClemente et al., 1991; for reviews, see Niaura & Abrams, 2002; Sussman, Sun, & Dent, 2006). In addition, there are self-help groups (e.g. Nicotine Anonymous), voluntary health organisations, commercial programmes as well as acupuncture and hypnosis to help those who are

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willing to reduce their cigarette consumption. Finally, pharmacological interventions (e.g. nicotine replacement therapies) are used either alone or in conjunction with the counselling interventions mentioned above (Silagy, Mant, Fowler, & Lodge, 1994). Quitting rates vary from 5 to 40%, depending on the population and treatment (Lichtenstein & Glasgow, 1992, 1997). These modest quitting rates point again to the difficulties people have when trying to master behaviour change in cigarette reduction.

For people to enrol in and benefit from such treatments, they need to have the 'will' to reduce their cigarette consumption. Even spontaneous cessation of smoking (Ockene, 2009) depends on such a 'will'. In other words, people need to commit to the goal of fighting their addiction. Therefore, the study of how people commit to goals has critical relevance for the study of successful smoking reduction. The present research explores whether a self-regulation procedure found to help people commit to goals, mental contrasting of future and reality, can be fruitfully applied in the domain of commitment to smoking reduction.

Goal commitment has been defined as 'one's attachment to or determination to reach a goal' (Locke, Latham, & Erez, 1988, p.24). Commitment to goals is a prerequisite for successful goal striving, especially when goals are difficult to achieve (Locke & Latham, 1990; for review, see Klein, Wesson, Hollenbeck, & Alge, 1999). Its main sources are the goal's desirability (incentive value) and feasibility (expectations of success, Klinger, 1975; for review, see Oettingen & Gollwitzer, 2001). Researchers have measured goal commitment in various ways and by various indicators. First, they have directly asked participants to indicate the extent of their commitment (e.g. 'I am strongly committed to pursuing this goal'; Hollenbeck, Klein, O'Leary, & Wright, 1989). However, the direct measurement of commitment assumes that people have insight into their own commitment. As people often lack this insight, researchers have assessed goal commitment indirectly by asking participants for cognitive or behavioral indicators of actual goal striving (for review, see Locke & Latham, 1990; Klein et al., 1999; Oettingen & Gollwitzer, 2001). For example, participants reported the degree of thinking about attaining the goal (cognitive indicator), and the extent to which they are ready to act or already have acted towards goal attainment (behavioural indicator). As commitment stands for the degree to which a person feels compelled to act in the service of attaining the goal, behavioural indicators of goal striving are considered to be particularly valid measures of commitment (Locke et al., 1988). Therefore, in the present research we assessed goal commitment by behavioural indicators.

The model of fantasy realization

The model of fantasy realization (Oettingen, 2000; Oettingen, Pak, & Schetter, 2001) specifies how fantasies about a desired future can be used to create strong goal commitments that lead to persistent goal striving and effective goal attainment. When people use the self-regulation strategy of mental contrasting (Oettingen, 2000), they first imagine a desired future (e.g. improved academic or professional performance) and then reflect on the respective negative reality (e.g. having little time or getting distracted). The conjoint elaboration of the positive future and the negative reality makes both future and reality simultaneously accessible (Kawada, 2004). This activates the relational construct (Higgins & Chaires, 1980) of negative reality standing in the way of realising the desired future, thereby emphasising a

necessity to overcome the present reality towards the desired future. The necessity to act in turn raises the question of how feasible it is to realise the desired future, and consequently it will activate relevant expectations of success. Being activated by mental contrasting, expectations of success will now influence goal commitments (i.e. make goal commitment expectancy dependent): when expectations of success are high, people will strongly commit to attaining the goal of overcoming the present reality and realising the desired future; when expectations of success are low, they will form a weak goal commitment or none at all.

However, if people only elaborate the positive future or only the negative reality, future and reality will not simultaneously be activated, and the reality does not present itself as standing in the way of the desired future. Thus, people will fail to recognise that they need to overcome the present reality in order to arrive at the desired future. As a consequence, expectations will not be consulted and they will not affect goal commitment. Focussing on either a positive future or a negative reality will thus produce expectancy-independent goal commitment that is moderate: it is neither increased by high expectations nor decreased by low expectations (Oettingen, Mayer, Sevincer, et al., 2009). In summary, it is mental contrasting of the future and reality (rather than elaboration of the future or reality only) that succeeds in strengthening commitment when expectations of success are high and in weakening commitment when expectations of success are low.

A series of experimental studies measuring goal commitment as the dependent variable supports these hypotheses (Oettingen, 2000; Oettingen et al., 2001; Oettingen, Mayer, Sevincer, et al., 2009). Participants were randomly assigned to one of at least three conditions. They either mentally elaborated both the desired future and negative reality (mental contrasting condition), only the desired future (positive fantasy condition) or only the negative reality (negative reality condition). In one experiment, adolescent students had to mentally contrast the positive future of excelling in mathematics (e.g. participants imagined feelings of pride, increasing job prospects) with the respective negative reality (e.g. participants reflected on being distracted by peers, feeling lazy). Two weeks after the experiment, students in the mental contrasting condition who initially had high expectations that they could improve the present reality in the direction of the desired future (i.e. excelling in math) received better course grades and teachers rated them as exerting more effort than those in the positive fantasy and in the negative reality conditions (Oettingen et al., 2001, Study 4). The same pattern of results emerged in school children starting to learn a foreign language (Oettingen, Hönig, & Gollwitzer, 2000, Study 1), in students wishing to solve an interpersonal problem (Oettingen et al., 2001, Studies 1 and 3, Oettingen, Mayer, Sevincer, et al., 2009, Study 1), in students being offered the opportunity to get to know an attractive stranger (Oettingen, 2000, Study 1), and in pediatric intensive care nurses wishing to improve their relations with their patients' relatives (Oettingen, Mayer, Stephens, & Brinkmann, 2009, Study 1). So far, research has shown that fantasies about a positive, desired future contrasted with negative reality that stands in the way of attaining the positive future help people to translate high expectations into binding goal commitments geared at approaching the positive future. The present research aims to replicate these previous findings in the domain of smoking reduction.

Importantly, however, it also aims to investigate whether fantasies about a negative, undesired future contrasted with positive reality that is endangered by the negative future may help to form binding goal commitments geared at avoiding a

negative health-related future (for review, of approach-avoidance achievement goals, see Thrash & Hurst, 2009). Specifically, fantasies about a negative future (e.g. being diagnosed with lung disease) that are mentally contrasted with reflections on a positive reality (e.g. present good health) potentially endangered by slipping into such an undesired future should produce goals geared at avoiding the negative future. That is, the present study tests whether people can utilise mental contrasting of fantasies about either a positive future or a negative future to commit to constructive health goals.

The option that goal commitments can also be achieved by mentally contrasting fantasies about the negative future would be welcome news for people who are plagued by self-regulation concerns that hinder the generation of fantasies about a positive future. For example, people who adhere to self-damaging behaviour (e.g. excessive alcohol consumption) might not readily generate fantasies about a positive future of reducing their alcohol consumption. Accordingly, fantasies about a negative future should be a building block for committing to the goal of abstaining from such bad habits. It is particularly important to form such goal commitments in the health domain because failure to commit to goals of improving health behaviour in a timely manner may have irreversible consequences. Therefore, in smokers, we investigated fantasies about a negative future resulting from continued smoking.

Smoking reduction

The smoking literature has identified innumerable health problems that arise as a result of cigarette smoking, including those to one's own health and those to the health of others in one's proximity, in both short and long terms (WHO, 2002). Smoking harms nearly every organ of the body, causing many diseases (e.g. cervical cancer, kidney cancer, pancreatic cancer, pneumonia and periodontitis) and reducing health in general, while quitting smoking has immediate as well as long-term health benefits (U.S. Department of Health and Human Services, 2004). Further, being exposed to second-hand smoke increases the risk of many diseases (e.g. sudden infant death syndrome, low birth weight, severe asthma, lung cancer and heart disease; U.S. Department of Health and Human Services, 2006).

A recent study (Wood, Wewers, Groner, & Ahijevych, 2004) showed that the most important motives for smoking are pleasure, relaxation, as well as tension and craving reduction. Smokers have more positive expectations about the look, feel and taste of a cigarette than non-smokers (Lewis-Esquerre, Rodrigue, & Kahler, 2005), and female adolescents believe that smoking will help them control their weight and manage their negative mood (Wahl, Turner, Mermelstein, & Flay, 2005). Further, those with positive expectations of smoking are more likely to smoke, experiment with smoking, and are more susceptible to smoking if they did not do so already (Anderson, Pollak, & Wetter, 2002). On the other hand, Fisher, Lichtenstein, Haire-Joshu, and Morgan (1993) contend that self-confidence and expectations of successfully reducing cigarette consumption help people quit smoking, and Dijkstra, De Vries, Kok, and Roijackers (1999) show that self-evaluative outcome expectations are also of importance in smoking cessation. More recently, Joseph, Manafi, Iakovaki, and Cooper (2003; see also Bandura, 1997) observed that one's perceived self-efficacy of quitting predicts actual quitting, and satisfaction with one's

quitting efforts predicts successful refraining from future relapse (Baldwin et al., 2006), though the relation of self-efficacy to quitting may be moderated by success in past quitting (Yzer & van den Putte, 2006). However, the literature to date has not begun to explore the potential involvement of fantasies about smoking, and how mentally contrasting these fantasies with reality may help to form commitments geared at mastering the addiction.

The present research

To test the idea that fantasies about both positive and negative futures produce strong goal commitments to reduce smoking when contrasted with respective reality (i.e. negative and positive reality, respectively), we conducted a study containing six conditions: Three positive future conditions referred to a positive future enjoying the advantages of reduced cigarette consumption (mental contrasting of positive future with negative reality, elaborating positive future only and elaborating negative reality only), and three negative future conditions referred to a negative future suffering from the disadvantages of prolonged cigarette consumption (mental contrasting of negative future with positive reality, elaborating negative future only and elaborating positive reality only). Based on previous measures of goal commitment and goal striving (Oettingen et al., 2001), the dependent variable was commitment in terms of the reported immediacy of acting on these fantasies (i.e. reducing cigarette consumption). Specifically, 2 weeks after the experiment, participants had to write down whether they had undertaken one or more steps towards reducing their cigarette consumption, and if so, to report on the exact date when they had acted on their step or on the most difficult step (in case they listed more than one step). In line with Oettingen et al. (2001), we then counted the number of days that elapsed until participants actually acted on this step. We measured acting promptly because commitment should be highest when people act promptly (Bandura, 1997; Locke & Latham, 1990; Gollwitzer & Moskowitz, 1996). Further, immediacy of action should be a particularly meaningful dependent variable if it does not systematically vary with the significance of that step. Otherwise, it might be argued that people act promptly mainly because they pick the less significant step. Therefore, to assess the significance of the step, two independent raters coded whether the step appeared to have minor or major consequences for cigarette reduction.

We hypothesised that mental contrasting of both positive future with negative reality and negative future with positive reality will lead to expectancy-dependent goal commitments. For mental contrasting of the positive future, we assumed in line with previous research that the relational construct (Higgins & Chaires, 1980) of reality standing in the way of realising the positive future will be activated. This should prompt a necessity to approach the positive future (of smoking less and being healthy). For mental contrasting of the negative future, we assumed that the relational construct of reality being endangered by the advent of the negative future will be activated. This should prompt a necessity to avoid the negative future (of smoking continuously and falling ill). In both cases, expectations to reduce cigarette consumption should influence forming goal commitments. Consequently, when these expectations are high, people will strongly commit to immediate action to reduce cigarette consumption; when expectations are low, they will form a weak goal commitment or none at all.

Method

Participants

A total of 210 female students from various universities in Berlin with a mean age of 22 ($SD = 2.77$), ranging from 19 to 34 years, participated in this study, which was advertised as 'a study on smoking behavior for smokers' and was said to be part of a larger investigation of young women's professional and personal life-span development. Students, separated by partitions, were tested 2–7 at a time. Participants were paid €10 (about US\$14).

Design

A 3 (positive future condition: mental contrasting of positive future with negative reality, positive future only, negative reality only) and a 3 (negative future condition: mental contrasting of negative future with positive reality, negative future only, positive reality only) design was used. The dependent variable was commitment to reducing cigarette consumption (immediacy of action). We hypothesised that in both the positive future and the negative future conditions, mental contrasting would lead to expectancy-dependent immediacy of reducing cigarette consumption, while in the future only and reality only conditions, we would find expectancy independence.

Materials and procedure

The female experimenter gave an overview of the procedure, told participants that their answers would remain confidential, and stressed that their participation was voluntary. Participants were also informed that 2 weeks after the experiment they would receive a short follow-up questionnaire. After they had given their informed consent, they were guided to their seats where they found the experimental materials. To guarantee anonymity, participants were requested to write down a personal code instead of their names. They were asked to note this code on a business card provided by the experimenter, and to keep it until they had answered the follow-up questionnaire 2 weeks later.

To test whether the predicted effects prevail over and above participants' smoking habits, we asked participants: 'Approximately, how many cigarettes do you smoke per day?' Further, to test whether the predicted effects hold over and above participants' past success or failure to quit smoking, we had them report when they had started to smoke, whether they already had attempted to quit, and if so, how long they had sustained their quitting attempts. We used the ratio of abstained time periods per total time of smoking to arrive at an index of successful quitting periods.

Because we hypothesised that mental contrasting (rather than elaborating the future only or the reality only) leads to expectancy-dependent goal commitment, we measured participants' expectation of reducing or stopping their cigarette consumption: 'How likely do you think it is that you will reduce your cigarette consumption or that you will stop smoking?' To ensure that our manipulation affected expectancy dependency of goal commitment over and above incentive value, we also asked students: 'How important is it to you to reduce your cigarette consumption or to stop smoking?' The 7-point response scales ranged from 1 (*not at all*) to 7 (*very*). Finally, to assure that inducing the various self-regulation strategies did not differentially affect expectation or incentive value, we measured both expectation

and incentive value a second time when assessing the dependent variable via the follow-up questionnaire.

Positive future conditions

Half of the participants had to list, in writing, four aspects that they associated with a positive future of reducing or stopping cigarette consumption (e.g. participants named more energy, self-respect, pretty skin) and four aspects of reality that stood in the way of reducing or stopping cigarette consumption (e.g. participants named stress, partying, peer pressure). They ranked these aspects of positive future and negative reality in order of importance before they were separated into three experimental groups.

In the *positive future mental contrasting condition*, participants copied the fourth most important positive future keyword to a sheet of paper containing the following instruction at the top of the page:

Think about this positive aspect of your personal future and depict the respective events or experiences in your thoughts as intensively as possible! Let the mental images pass by in your thoughts and do not hesitate to give your fantasies free rein. Take as much time and space as you need to describe the scenario. If you need more space to write, please use the back of the page.

After participants had finished writing, they transferred the third most important negative reality keyword to the middle of the page containing the same instructions as above. However, instead of 'positive aspect of your personal future' the instructions said 'negative aspect of your present reality'. After participants had elaborated and written about this keyword, they moved on to a second sheet. Here, they had to go through the same procedure regarding the most important positive future keyword (top of the page) and the second most important negative reality keyword (middle of the page). The order of importance of aspects was chosen to keep the importance of elaborated aspects constant across conditions.

In the *positive future only condition*, participants had to copy the fourth most important positive future keyword to the top of the first page, elaborate the keyword and write their thoughts down, just like in the positive future mental contrasting condition. However, participants then continued with the third most important, the second most important and the most important positive future keyword. In the *negative reality only condition*, participants began with the fourth most important negative reality keyword, and then moved on to the third most, the second most and the most important one.

Negative future conditions

The other half of the participants were asked to list in writing four aspects that they associated with a negative future of continued smoking (e.g. participants named lung cancer, yellow fingers, bad model for children), and four aspects of their positive reality that they could lose due to unmodified smoking (e.g. participants named healthy lungs, pretty skin, physical endurance). We then established three experimental groups in the same manner as described before for the positive future conditions.

Specifically, all participants first ranked the aspects of negative future and the aspects of positive reality that they had listed in order of importance. In the *negative*

future mental contrasting condition, participants were then asked to mentally elaborate two aspects that they associated with a negative future of unmodified smoking and two aspects of their positive reality that they could lose due to unmodified smoking in alternating order, beginning with a negative aspect of the future. Participants in the *negative future only condition* were requested to mentally elaborate the four aspects of the negative future; participants in the *positive reality only condition* were requested to elaborate the four aspects of their current positive reality that they could lose because of continued smoking. Rank-orders of elaborating future and reality aspects were parallel to the three positive future fantasies conditions.

For both positive future and negative future conditions, participants had to write down their thoughts and images. Thus, we could check whether participants followed instructions. Participants in all six conditions were successful in doing so. For example, different participants may have listed the same positive keyword in both the positive future and the positive reality scenarios, but depending on conditions these terms were elaborated in different ways. Thus, participants in the positive future conditions elaborated pretty skin as something they would enjoy attaining (e.g. my skin would clear up and I would not need to constantly think about it when being with others). In the negative future conditions, on the contrary, participants would elaborate pretty skin as part of their positive reality (e.g. people still envy my pretty skin and fitness).

Dependent variables

Two weeks after the experiment, participants received a short follow-up questionnaire in the mail, which they had to send back within the next couple of days. We received completed questionnaires from 155 participants (74% of $N=210$). There was no difference between participants who sent back their follow-up questionnaire and those who did not in terms of incentive value, condition, age, years of smoking, number of pre-experimental cigarettes and success in quitting attempts, $p > 0.15$, but there was a difference concerning expectation, $F(1, 208) = 6.72$, $p < 0.05$. Those participants who sent back their questionnaire had lower expectations ($M = 4.36$, $SD = 1.53$) than those who had not ($M = 4.96$, $SD = 1.33$). A 2 (Group: sent back versus sent not back) \times 6 (Conditions) ANOVA with expectation as dependent variable showed that there was no interaction effect between participants sending back their questionnaires and condition, $F(1, 198) = 0.87$, $p > 0.50$, indicating that the difference in expectation was not qualified by condition (i.e. did not differ across conditions).

Participants' immediacy of action was assessed in the follow-up questionnaire. Specifically, to first make people review the time period since the experiment, we asked them to indicate whether they had taken one or more steps in order to reduce their cigarette consumption or to stop smoking between the time they had participated in the experiment and the time they completed the questionnaire. Participants then were asked to list the step(s) they had taken, and if they had taken more than one step, they were supposed to first list the most difficult one. Then participants had to report the exact date they had performed their step or their most difficult step, respectively. Immediacy of action was defined as the difference in the amount of days between the date participants reported taking the step (or the most difficult step) and the date of participation in the experiment (Oettingen et al., 2001).

Of the 155 participants returning the follow-up questionnaire, 84 participants (54%) had taken one or more steps. For the 71 participants (46%) who had not undertaken any steps, we took the duration of the study (16 days).

To explore whether the step was minor or major in its significance for cigarette reduction, we had independent raters, blind to conditions, content analyse the significance of the step. A step that was unspecified in its context and outcome for cigarette reduction was rated as minor in significance, whereas a step that was highly specified in its context and outcome for cigarette reduction was rated as major. To assess whether the step listed was minor or a major in significance, the independent raters used a 5-point scale reaching from 1 (*minor, not very significant*) to 5 (*major, very significant*).

The step was rated as a 1 (*minor significance*) when participants reported having sometimes thought about reducing their cigarettes, told themselves to smoke less or postponed cigarette reduction. For example, participants wrote: 'I imagined an ideal person who does not smoke', 'I told myself that I should not smoke' or 'I told myself to stop smoking once the exam is over'. A rating of 3 (*moderate significance*) was given when participants reported having used thought or behavioural strategies to divert temptations. For example, participants wrote: 'Consciously said "No,"' 'Left cigarettes at home' or 'I tried to abstain from cigarettes when watching TV'. A rating of 5 (*major significance*) was given when participants reported having successfully diverted specific temptations and having effectively reduced their consumption. For example, participants wrote: 'I did not buy any cigarettes anymore, and also did not take them from others', 'I did not smoke despite being offered cigarettes' or 'I did not smoke despite stress'. Inter-rater reliability was high ($r = 0.89$).

Results

Descriptive analyses

Pre-manipulation mean expectations of reducing or stopping cigarette consumption was above the mid-point on the 7-point scale ($M = 4.36$, $SD = 1.53$), as was the mean for incentive value ($M = 4.50$, $SD = 1.83$). The two variables correlated positively ($r = 0.51$, $p < 0.001$). Participants had been smoking an average of 5.5 years ($SD = 3.28$) and the average number of cigarettes per day was 11.69 ($SD = 6.71$). About a third of the participants (57 of 155 or 36.8%) reported quitting attempts ($M = 118.34$ days, $SD = 239.74$). Quitting time per total smoking time ranged from 0 to 62% ($M = 6\%$, $SD = 10\%$). Years of smoking correlated slightly negatively with expectation ($r = -0.12$, $p < 0.15$), but there was no correlation with incentive value ($r = -0.01$, $p > 0.92$). Participants who reported past quitting successes had higher expectations ($M = 4.92$, $SD = 1.52$) than those participants who had never stopped before ($M = 4.02$, $SD = 1.44$); $t(153) = 3.68$, $p < 0.001$. Additionally, duration of quitting periods per total smoking time correlated positively with expectations of reducing or stopping cigarette consumption, $r = 0.22$, $p = 0.05$.

The dependent variable of immediacy of action had a mean of 9.75 days ($SD = 6.51$). To assure that the pattern of results was not due to variations in incentive value, duration of smoking and the amount of cigarettes participants smoked before the experiment, we statistically controlled in the following analyses for these three variables.

Immediacy of action

Hypothesising an interaction effect between condition and our continuous measure of expectation in predicting immediacy of action, we estimated two general linear models (GLM): one involving the positive future conditions and the other involving the negative future conditions. Specifically, we used GLMs with immediacy of action as the dependent variable, condition as a fixed between-subject factor and the continuous expectation measure as independent variable entered in the first step; the interaction term of condition by the continuous expectation measure was entered as independent variable in the second step (Hardin & Hilbe, 2001).

In the positive future conditions, we observed neither a main effect of condition nor of expectation, $F_s(69) < 0.58$, $p_s > 0.44$, but the predicted interaction effect, $F(2, 67) = 3.60$, $p < 0.05$.¹ That is, the relation between expectation and immediacy of action was stronger in the positive future mental contrasting condition than in the positive future only and negative reality only conditions combined, $t(69) = 2.73$, $p < 0.01$; the latter two conditions did not differ from each other, $t(67) = 0.03$, $p > 0.49$ (Figure 1). When expectations of success were high (expectation = 7), participants in the positive future mental contrasting condition reported having started earlier to reduce their cigarette consumption than those in the positive future only and the negative reality only conditions, $t(69) = 2.25$, $p < 0.05$, whereas when expectations of success were low (expectation = 1), participants in the positive future mental contrasting condition reported having started later, $t(69) = 2.60$, $p < 0.01$.

Regarding the negative future conditions, we observed neither a main effect of condition nor of expectation $F_s(72) < 0.88$, $p_s > 0.35$, but the predicted interaction effect $F(2, 70) = 2.78$, $p < 0.05$. The relation between expectation and immediacy of

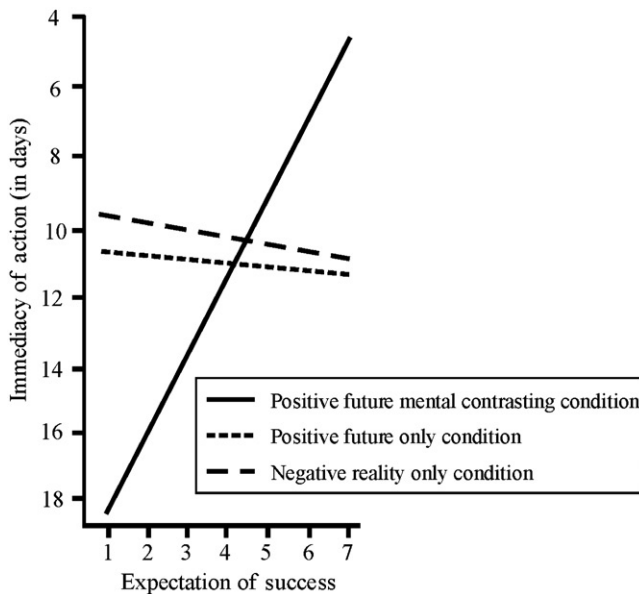


Figure 1. Regression lines depicting the link between expectation and immediacy of action as a function of positive future mental contrasting condition, positive future only condition and negative reality only condition.

action was stronger in the negative future mental contrasting condition than in the negative future only and positive reality only conditions combined, $t(72)=2.36$, $p<0.05$; the negative future only condition and the positive reality only condition did not differ from each other, $t(70)=0.02$, $p>0.49$ (Figure 2). When expectations of success were high (expectation=7), participants in the negative future mental contrasting condition reported having started earlier to reduce or stop their cigarette consumption than those in the negative future only and the positive reality only conditions, $t(72)=1.92$, $p<0.05$. When expectations of success were low (expectation=1), negative future mental contrasting participants reported having started later, $t(72)=2.24$, $p<0.05$.

To test whether the positive future mental contrasting condition provided similar results to the negative future mental contrasting condition, we computed a GLM with immediacy of action as the dependent variable, condition (mental contrasting, future only, reality only) and future focus (positive future vs. negative future) as fixed between-subject factors, and the continuous expectation measure as independent variable entered in the first step; the interaction terms of future focus by expectation, condition by expectation, future focus by condition and future focus by condition by expectation were entered as independent variables in the second step. No main effect of future focus, condition or expectation emerged $F_s(147)<1.16$, $p_s>0.28$, but the predicted interaction effect of condition by expectation remained, $F(2, 140)=6.42$, $p<0.01$. No other interaction terms reached significance, $F_s(140)<0.10$, $p_s>0.75$. These findings support our hypothesis that mental contrasting of a positive future as well as mental contrasting of a negative future produces expectancy-dependent immediacy of action.

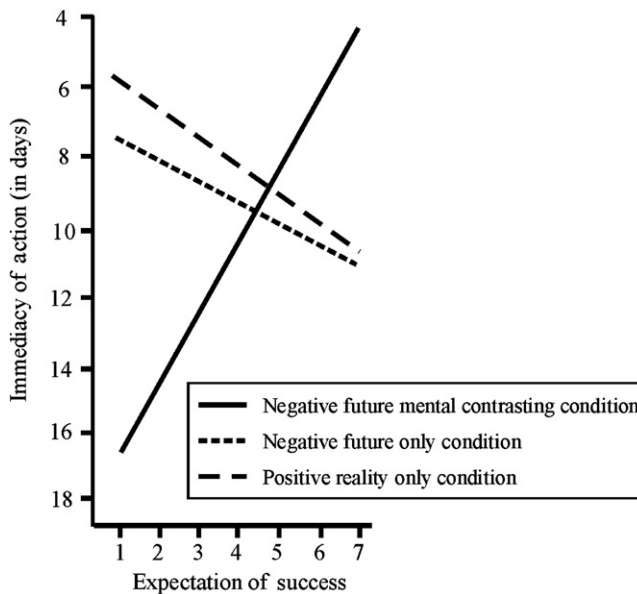


Figure 2. Regression lines depicting the link between expectation and immediacy of action as a function of negative future mental contrasting condition, negative future only condition and positive reality only condition.

To investigate the relation of immediacy of action and significance of the step towards cigarette reduction, we computed the following analyses: for participants who named one or more steps, we added the significance of the step as another covariate in the GLM described above. The results did not change: The predicted interaction effect of condition by expectation remained, $F(2, 68) = 2.80$, $p < 0.05$ and no other interaction terms reached statistical significance, $F_s(68) < 0.23$, $p_s > 0.72$. In addition, we computed correlations between immediacy of action and significance of step. Immediacy of action did not significantly correlate with significance of step ($r = -0.06$, $p > 0.57$). Further, correlations were statistically non-significant in all of the six conditions taken separately (ranging from $r = -0.29$ to $r = 0.35$; $p > 0.22$). These results suggest that high-expectancy participants in the mental contrasting conditions did not act comparatively faster simply because their step was more minor in comparison to steps taken by other participants.

Changes in expectation and incentive value as alternative processes

To test whether the observed pattern of results was related to a change in level of expectation or incentive value due to the different mental elaborations, we measured both expectation and incentive value a second time when assessing the dependent variable via the follow-up questionnaire. While expectations did not change from before to after mental elaborations, $t(154) = 0.52$, $p > 0.60$, incentive value increased from $M = 4.5$, $SD = 1.83$ to $M = 4.92$, $SD = 1.95$, $t(153) = 3.98$, $p < 0.001$. Importantly, however, a one-way ANOVA showed that differences in mean level of expectation and incentive value from before to after mental elaborations did not vary between groups, $F(5, 149) < 0.44$, $p > 0.82$.

Discussion

Regardless whether mental contrasting involved fantasies about the positive future or fantasies about the negative future, participants performed in accordance with their expectations. Those with high expectations of success reported to have started earliest with reducing their cigarette consumption and those with low expectations of success delayed their action to reduce cigarette consumption. That is, participants in the mental contrasting conditions who believed that chances of success were high immediately acted towards cigarette reduction, whereas those who believed that chances of success were low deferred their action.

Importantly, one might suspect that participants who acted sooner did so based on having named a minor step, so that the prompt action only meant minor progress towards cigarette reduction. This, however, was not the case. Indeed, the significance of the step for cigarette reduction did not significantly or systematically correlate with immediacy of action, neither across the sample nor within the six conditions.

Theoretical implications

Mental contrasting made people initiate immediate action in proportion to their expectations of success. Participants with high expectations in the mental contrasting conditions acted swiftly, and those with low expectations delayed their action. We speculate that the prompt action in the high-expectancy mental contrasting

participants may be beneficial in the short and the long run, because acting swiftly should provide more opportunities to reach success, especially as this action did not pertain to a minor step. Participants in the mental contrasting conditions with low expectations delayed their actions. There may be drawbacks or benefits to such delay behaviour. On the one hand, one might rightfully argue that delayed action in reducing cigarette consumption should hurt and acting promptly should be beneficial in the short and the long run. However, one might also speculate that low-expectancy smokers may be better off postponing their action, especially when it pertains to a difficult step. Thus, they may avert ego-depletion (Baumeister, Bratlavsky, Muraven, & Tice, 1998) and the grim consequences of continued relapse (Bandura, 1997; Marlatt & Donovan, 2005). Mental contrasting may have helped participants to postpone their self-regulation efforts until a point in time that was more opportune. For example, a person preparing for a difficult exam might have wisely relinquished efforts to reduce cigarette consumption until the exam was over.

Our findings also show that participants who engaged in one-sided elaborations of future only or reality only acted on reducing cigarettes irrespective of whether they felt high or low chances of success (Figures 1 and 2). As pointed out before, such lack of discriminative skills (Mischel, 1973) may put smokers at risk for missing the possibility of 'wisely using their resources'. However, one might also argue that one-sided elaborations shelter low-expectancy people by making them 'stay in the field' (Lewin, 1946). Future research needs to determine the long-term health consequences of the different modes of thought for low-expectancy smokers. Such research could then also measure the actual number of cigarettes smoked and to what extent mental contrasting versus the other modes of thought led to reducing the number of cigarettes versus quitting altogether.

The present research replicates previous research on mentally contrasting fantasies about the positive future in the domain of smoking reduction. It also shows in one design that mental contrasting of both positive and negative futures can lead to expectancy-dependent commitments towards constructive health goals. Thereby, it extends previous research on mental contrasting of a negative future with positive reality by showing that mental contrasting of a negative future with a positive reality that might be endangered by one's bad health behaviour makes people avoid the negative feared health-related future.

Importantly, in past research on mental contrasting of a negative future, Oettingen, Mayer, Thorpe, Janetzke, and Lorenz (2005, Study 2) hypothesised and observed that mentally contrasting a negative future with a positive reality that *stands in the way* of the negative future creates goals to *approach* the negative future. Specifically, adolescents in a highly homogenous neighbourhood who were led to mentally contrast a negative feared future (i.e. influx of immigrants) with an impeding positive reality (i.e. reports on immigrants acting friendly and helpful) showed expectancy-dependent tolerance and support for the immigrants. To the contrary, one-sided elaborations of the negative future and one-sided elaborations of the impeding positive reality made the adolescents feel and act in an expectancy-independent way.

The present and the past research combined shows that mental contrasting of negative futures may be used to achieve two objectives. It enables people to initiate action to avoiding undesired futures (the present experiment) and it enables people to readily approach undesired futures (Oettingen et al., 2005). In the former case, the relational construct activated is 'positive reality is endangered by the negative

undesired future' and in the latter case it is 'positive reality is standing in the way of the negative undesired future'. In sum, by activating the respective relational construct, mental contrasting of a negative future with positive reality will lead high-expectancy people to either avoid or approach their negative undesired future.

However, the present study has several weaknesses. First, we used behavioural measures of immediacy of action, but we did not observe participants' actual success in reducing or stopping their cigarette consumption. Also, we do not know whether the various modes of thought differ in their effects for participants who set out to reduce versus to stop smoking. Finally, future studies should replicate the results with male participants and with participants from other cultural backgrounds. Though we reliably find mental-contrasting effects in participants of Western cultures, we cannot infer from the present results that we will find the same effects in the members of cultures where seeking a unique and stable truth is less valued and which thus allows for more contradiction (Heine & Lehman, 1997; Heine, Lehman, Markus, & Kitayama, 1999). In such cultures, mental contrasting may fail to create a discrepancy between future and reality with its subsequent necessity to act and expectancy-guided goal commitment.

Applied implications

Our findings suggest that people may use their fantasies about the future, whether positive or negative, as a self-regulation strategy to help them master their bad habits and addictions. However, the fantasies need to be mentally contrasted with the respective negative or positive reality. Though mental contrasting demands the performance of a series of relatively complex cognitive procedures in a specific order, it still can be easily applied in everyday context. Learning how to use mental contrasting rather than elaborating only the future or only the reality would provide people with the opportunity to actively deal with their everyday temptations and bad habits, such as regularly consuming alcohol or smoking cigarettes. Indeed, in recent cost- and time-effective intervention studies lasting up to 4 months, healthy adults and patients with chronic back pain benefited greatly from being taught how to mentally contrast and plan effective steps towards a more healthy life style (Adriaanse et al., 2009; Schramm, Oettingen, Klinger, & Dahme, in press; Stadler, Oettingen, & Gollwitzer, 2009; for review, see Oettingen & Gollwitzer, in press). Our findings imply that mental contrasting interventions to improve health behaviour can use people's everyday fantasies about positive desired futures as well as negative undesired futures. This is especially relevant when people, for whatever reason, are unable to generate fantasies about a positive future of health behaviour improvements (e.g. because of depression, drug urge or naive theories stressing behaviour stability).

The procedure of mental contrasting could also supplement trainings that raise expectations. Indeed, our findings showed that mental contrasting made people promptly start reducing their cigarette consumption only when expectations of success were high. When expectations of success were low, mental contrasting made people postpone their efforts to quit. Thus, mental contrasting may be considered a problematic strategy for smoking reduction whenever people do not know how to strengthen their respective expectations of success, either on their own or by attending respective trainings (e.g. Bandura, 1997). In such cases of chronic low

expectations, the strategies of focusing on the future only or focusing on the reality only will help them stay engaged in reducing their cigarette consumption at least at a moderate level.

Conclusion

People can reap the benefits of mental contrasting not only when applying it to their fantasies about a positive future, but also to their fantasies about a negative future. Regardless of whether participants fantasised about a positive or negative future, mental contrasting helped to initiate relevant efforts to reduce cigarette consumption in line with their expectations of success. Importantly, the present results also imply that focusing solely on the future or focusing solely on the reality may be beneficial for those health concerns where low expectations of success prevail.

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Note

1. For all directional hypotheses, p -values reflect one-tailed significance tests.

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