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Mental contrasting facilitates academic performance in school children

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Abstract Two brief intervention studies tested whether teaching students to mentally contrast a desired future with its present reality resulted in better academic performance than teaching students to only think about the desired future. German elementary school children ($N = 49$; Study 1) and US middle school children ($N = 63$; Study 2) from low-income neighborhoods who were taught mental contrasting achieved comparatively higher scores in learning foreign language vocabulary words after 2 weeks or 4 days, respectively. Results have implications for research on the self-regulation of commitment to solve assigned tasks in classroom settings, and for increasing academic performance in school children in low-income areas.

Keywords Mental contrasting · Positive thinking · Self-regulation · Goal commitment · Academic performance · Behavior change · Desired future

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Introduction

Imagining one's future in a positive light is widely assumed to improve motivation and achievement. School advocates concerned about students' well being and achievement praise positive thinking, claiming that instead of dwelling on negative thoughts about an upcoming test, students should keep repeating, "I'll pass with flying colors." (Stauffer, n.d.). Self-help books with titles like, "Unlimited Confidence," (Känd 2007) or "The Power of Positive Talk," (Bloch and Merrit 2003) all send the message of positive thinking to children and educators. This enthusiasm for positive thinking may lead many educators to believe that school children would perform better in school if they mentally elaborated their positive academic futures.

This trust in the power of positive thinking may particularly apply to schools in low-income areas that aim to improve their students' success in class work, homework, grades, and ultimately college admission. To encourage students' focus on academic success, such schools often display the names of past students and the colleges they attended in the hallways and name classes or advisory groups after famous colleges. All these measures are geared to motivate students to dream of similar future accomplishments. The educators' hopes are that positive thinking about the wished-for future will improve their students' present performance. However, children who indulge in positive thoughts about their future successes may not form the goal commitments needed to achieve their hoped-for futures. In the present research, we hypothesized that to incite the goal commitment necessary for persistent learning and enhanced academic performance, elementary school children must not only mentally elaborate the desired future, but must also be taught to

consider the obstacles standing in the way of attaining this wished-for future.

Strong commitment to a goal is essential for its attainment, especially when goals are not easily achieved (Locke and Latham 1990). Goal commitment is facilitated when the task is feasible (i.e., high expectations of success) and desirable (i.e., high incentive value; Atkinson 1974; Bandura 1977; Locke and Latham 1990; Mischel 1973). However, goal commitment does not only depend on feasibility and desirability (Oettingen and Gollwitzer 2001). The model of fantasy realization (Oettingen 2000; Oettingen et al. 2001; summary by Oettingen and Stephens 2009) postulates that whether high feasibility and desirability foster goal commitment depends on the mode of self-regulatory thought regarding the desired future. Two of the modes of self-regulatory thought specified in the model are distinguished in the present paper: Solely thinking about the positive future versus mentally contrasting the positive future with the present reality.

Only thinking about the positive future (indulging), unconstrained by present limitations or factual knowledge (Oettingen and Mayer 2002), may obscure the fact that achieving the desired future requires exerting substantial effort, overcoming hindrances, and resisting temptations. Consequently, only thinking about the positive future should not heighten commitment to attain the desired future. On the contrary, strong goal commitment should emerge from mentally contrasting a desired and feasible future. When people mentally contrast, they imagine a desired future (e.g., excelling in academic performance) and then reflect on the present reality that stands in the way of reaching that future (e.g., obstacles or temptations such as having little time or being distracted). When the desired future is feasible, mental contrasting turns this imagined future into a binding goal, that is, it creates strong goal commitment; mental contrasting leads people to let go of attaining their desired future when this future is unfeasible.

Fantasy Realization Theory (FRT) posits that mental contrasting creates goal commitment by the following mechanism: When feasibility is high, mental contrasting builds strong mental associations between the future and reality in the sense that the reality is now seen as a surmountable obstacle. As a result, mental contrasting provides the energy and commitment to overcome the obstacle and reach the desired future. When feasibility is low, mental contrasting weakens the mental associations between future and reality as the person realizes that the obstacle is insurmountable. As a result, when feasibility is low, mental contrasting decreases one's energy and commitment (Kappes and Oettingen 2010; Oettingen et al. 2009). On the contrary, thinking of the desired future (indulging) does not change associations between future and reality, and the reality is not perceived as an obstacle. Thus, unlike mental contrasting, only focusing on the positive future leaves the prior commitment of a person unchanged.

In sum, mental contrasting of future and reality is a self-regulatory strategy that translates feasible wishes into binding goals. There are numerous experimental studies supporting this idea. For example, mental contrasting helped adolescents improve their grades in math (Oettingen et al. 2001), young adults to get to know an attractive stranger (Oettingen 2000), students to enroll in a program to improve their personality (Oettingen et al. 2005), middle-aged health-care providers to give higher quality of help (Oettingen et al. 2010b), college-aged women to reduce their cigarette consumption (Oettingen et al. 2010a), and university students to successfully cope with acute stress (Oettingen et al. 2009).

The present research

Two brief intervention studies focus on mental contrasting as a strategy that young children can use to successfully learn new materials in their everyday academic context. Specifically, we taught students either to mentally contrast or to only think positively about successfully learning foreign language words. We hypothesized that children in the mental-contrasting condition would perform better on a foreign language quiz than those in the only positive-future condition.

Similar to other intervention work that involves mental contrasting (see e.g., Stadler et al. 2009, 2010; Christiansen et al. 2010; Kirk et al., in press), we led participants to mentally contrast desired futures with high rather than low feasibility, in order to guarantee that mental contrasting would increase, rather than decrease goal commitment. Specifically, we guaranteed high feasibility by having participants learn words that, according to their teachers, could be learned by all participating students. Thus the obstacles that stood in the way of participants succeeding at the task were not capability-related, rather effort-related, and therefore surmountable. In addition, we chose the task to be a new task: Learning various words in a new language (Study 1), and the same word in various new languages (Study 2). As a result, unlike in most lab and field experimental studies on mental contrasting, in the present intervention, children could not rely on past experience (possibly weak performances) for predicting how well they will do in solving the task.

By using the described procedure, the present research allows for applying mental contrasting in standardized class contexts and it allows for the assessment of effort and performance in standardized ways. Therefore, it adds to past intervention research on mental contrasting where high feasibility of the desired future was guaranteed by

having participants generate and name idiosyncratic wishes that they confidently felt capable of fulfilling (Johannessen et al. 2010; Stadler et al. 2009, 2010).

By adjusting the academic task to meet the capabilities of all participating students, we also explored a way to make mental contrasting motivationally fruitful not only for those with strong academic capability but also for those who are relatively less capable. Not leaving students with relatively low capabilities behind is particularly important when it comes to supporting children in elementary and middle school who need to learn basic academic skills for their subsequent school career and transition into adulthood (e.g., Becker and Luthar 2002; Eccles et al. 1991; Havighurst 1948/1972). Preparing children for a successful school career appears especially challenging for children from low-income backgrounds, who as a group receive less support from parents and other educators (Anderson et al. 2000).

In the present research, we chose learning words in foreign languages as the basic academic task. In Study 1, participants were second and third grade students in a German elementary school whose task was to learn common English words (e.g., train, car, happy, sad). In Study 2, participants were fifth graders in a US middle school whose task was to learn *thank you* in various languages. Study 1 and Study 2 alike had distinctive and normative rewards for successfully learning a specified number of the foreign words, a bag of candy (Study 1) and a monetary reward (Study 2).

Study 1: Mental contrasting and learning English vocabulary in German elementary school children

Method

Participants and design

Students at a low-income urban public elementary school in Germany were recruited using implied parent consent and signed child assent procedures. A total of 49 children (22 female) elected to participate: 28 second-grade students and 21 third-grade students. Students in each class were randomly assigned (two second-grade classes and one third-grade class) to either a mental-contrasting condition or a positive-future control condition. Specifically, students were taught to mentally contrast or to only think about successfully learning the English vocabulary words.

Procedure and materials

At Time 1, the interventionist first explained that a game would be played involving a prize of a bag of candy. In two sessions during the next week he would give to each student a study packet of 15 cartoon pictures with their corresponding English vocabulary words and explain the meaning of the pictures and their corresponding words to the students. After 2 weeks, students would take a quiz testing them on 10 of the 15 vocabulary words; the quiz would involve writing each English vocabulary word under its corresponding picture. Students also learned that if they correctly identified 4 or more words (in the case of second grade) and 7 or more words (in the case of third grade) they would win the prize of a bag of candy.

After these general instructions, each participant was given a three-part booklet to be filled out in class. The first part of the booklet asked students to write down their name, class, and gender. Then students indicated their expectations and incentive value to successfully solve the task by responding to the questions "How sure are you that you will correctly translate the English words and win a bag of candy?" and "How important is it for you to correctly translate the English words and win a bag of candy?" The answer scales ranged from 1 (*not at all*) to 5 (*completely*). The third part of the booklet contained the intervention. The interventionist asked all students to identify, imagine and write about the best thing that they associated with correctly naming the English vocabulary words and winning the prize. Specifically, they were asked:

> Imagine you would correctly write 7 or more of the English words next to their corresponding pictures and would win the prize. What would be the best thing about this? Now imagine the best thing and write your thoughts on the lines…

Students in the mental-contrasting condition were then asked:

> Which behavior of yours could stand in the way of you correctly writing 7 or more of the English words next to their corresponding pictures? What behavior of yours could hinder you? Now imagine this behavior or hindrance and write your thoughts on the lines…

In contrast, participants in the positive-future control condition were asked:

> Imagine again you would correctly write 7 or more of the English words next to their corresponding pictures and would win the prize. What would be the second best thing about this? Now imagine the second best thing and write your thoughts on the lines…

The text specified "7 or more of the English words," for third graders and "4 or more of the English words" for second graders. To reiterate, in both conditions, children were first asked to write about the best thing of successfully naming the words. Afterwards, children in the two

conditions received different instructions: In the mental-contrasting condition, they were then asked to write about a behavior of theirs that could hinder them, while in the positive-future control condition, they were then asked to write about the second best thing. All the instructions that the students received were written in the booklet, not voiced by the interventionist.

At Time 2 and 3, the interventionist explained the vocabulary words. Specifically, he distributed the packets containing the cartoon pictures and their corresponding English words to the students. The interventionist then explained each English word and told the students its German counterpart in two 15-min sessions. During Time 2, which was 2 days after Time 1 (i.e., the intervention) the students were given 10 of the 15 words. During Time 3, which was 1 week after the intervention and 1 week before the quiz, the students were given the remaining 5 words. Students were given the packets to take home and study. The packets were only study sheets and did not contain any practice material. The interventionist assured the students that the packets were theirs to keep and would not be collected and that if students lost their packet, replacement packets would not be given.

Importantly, all the words in the English vocabulary packet had been first examined by the teachers to ensure that all students could score well enough to win the prize on the final quiz if they put effort into learning the vocabulary. The English vocabulary was a random mix of simple nouns and adjectives. For the third grade 10 of the 15 words were different and more difficult than those for the second grade, while the remaining five words were given to both classes.

At Time 4, the dependent variable was assessed. Specifically, the interventionist administered a quiz containing 10 of the 15 cartoon pictures from the English vocabulary packet. Each picture had a blank line beneath it on which the participants were told to write the corresponding English word. Students were told not to talk to one another and not to look at one another's papers; the testing was overseen by the interventionist. After completion of the quiz, students who correctly identified 7 or more English vocabulary words in the third grade and students who correctly identified 4 or more of the English vocabulary words in the second grade received a prize of a bag of candy.

A whole point was awarded when the word was spelled correctly and written underneath the correct picture. A word was awarded half a point when misspelled and written underneath the correct picture. When a word was written under the wrong picture, whether misspelled or not, or when the picture was left blank, the student was awarded zero points. Quiz scores ranged from 0 to 10.

Table 1 Correlations, Ms, and SDs for variables used in Study 1 ($N = 44$)

Variables	*M* (SD)	1	2
1. Expectation	3.23 (0.91)	–	
2. Incentive value	3.76 (1.24)	.40**	–
3. Quiz score	3.74 (1.83)	.34*	−.04

* $p < .05$; ** $p < .01$

Results

Descriptive analyses

The following results were analyzed with 44 participants (90% of the total sample, 18 in the mental contrasting condition and 26 in the positive future control condition), because five participants were absent for the second session due to a school-organized sports competition. Of these five participants, four were in the mental-contrasting condition and one was in the positive-future control condition. There were no differences between students who filled in the second questionnaire and those who did not, in terms of class, expectation, and incentive value, all Fs $< .89$, ps $> .35$. Quiz score (range: 0–8.50) did not correlate with incentive value but correlated with expectation (Table 1).

Randomization

There was no difference between students of the mental-contrasting condition and those of the positive-future control condition in terms of gender, class, incentive value, and expectation, all Fs < 3.49, ps $> .07$.

Vocabulary quiz

We estimated a General Linear Model (GLM) with quiz score as the dependent variable, condition as a fixed between-subject factor, and expectation and incentive value as covariates. We did not find a significant main effect for incentive value, $F(1, 40) = 3.27$, $p > .07$, $\eta_p^2 = .08$, but in line with previous research on expectations facilitating academic performance (e.g., Bandura 1997; Schunk 1991; Pajares 2003), we observed a main effect for expectation with high expectations predicting high quiz scores, $F(1, 40) = 6.76$, $p < .02$, $\eta_p^2 = .15$. More importantly, the predicted main effect for conditions emerged, $F(1, 40) = 4.65$, $p < .04$, $\eta_p^2 = .10$, with participants in the mental-contrasting condition achieving higher scores than those in the positive-future control condition ($M = 4.42$ vs. $M = 3.27$). This finding shows that the beneficial effect of mental contrasting compared to only thinking about the

positive future is present beyond the predictive relations of expectation.

In the present intervention study, we predicted that expectation and incentive value would not moderate the condition effects on performance because solving the task was feasible and desirable to all children. To test this prediction, we computed two additional analyses. Specifically, we reran the General Linear Model described above twice, testing whether there were interaction effects between condition and expectation and between condition and incentive value. As predicted, no significant interaction effects emerged, all Fs $< .23$, ps $> .63$.

Discussion

Elementary school students taught to mentally contrast their success of solving a feasible academic task obtained higher scores than those who were taught to only think about their success. Specifically, juxtaposing the positive thoughts and images of learning the words on a foreign language quiz and winning the prize with the obstacles that may hinder this success helped the children learn the foreign language words. That is, students' thoughts and images about future successes are not necessarily idle but can indeed be fruitfully used to heighten effort and success: The thoughts and images only need to be linked to the obstacles of present reality that stand in the way of attaining the wished-for positive future.

Importantly, we ensured that learning the words was a task which was new to the children and which potentially could be mastered by all children. Therefore, because children's expectations were not based on past performance and obstacles could be overcome by children of high and low capabilities alike, we hypothesized and observed that mental contrasting benefits children regardless of expectations. This finding implies that educators who aim to use mental contrasting in order to strengthen goal commitment in children who exhibit relatively low capabilities should choose tasks for their students that are new and lie well in the limits of their capabilities. The findings also suggest that educators can use mental contrasting in group settings and with respect to standardized tasks if they construct the task in a way that all children have the capabilities to overcome the obstacles.

Strikingly, we observed the beneficial effects of mental contrasting versus only thinking about the positive future in elementary school children as young as second and third grade. The instructions were given in a group setting (not individualized), in written form (not voiced), and they took no more than 10 min of the children's time. In sum, mental contrasting benefits even individuals who have just started their elementary education, and even when the instructions are very brief and are not individualized.

English is the world language and thus is perceived as highly instrumental for effective communication with others. But what about learning other, less common and influential languages? Could mental contrasting also help American children learn foreign language words? In Study 2, we tested whether the results would be observed even if students had to learn one word in many different new languages, contrary to Study 1, where they learned many different words in one and the same new language, English. The task in Study 2 was to learn *thank you* in languages spoken in many different countries whereby the languages were not familiar to the students (e.g., languages spoken in Denmark, Russia, Japan, Kenya, Saudi Arabia, Brazil).

Participants in Study 2, middle school children in fifth grade, had just started a new school. Thus, they had to master the stressors of the transition to a new institution as well as the transition from elementary to middle school. During such transitions, children are particularly in need of help to learn new materials and adjust to the unknown contexts and curricula (Blyth et al. 1983). Finding beneficial effects of mental contrasting compared to only positive thinking under such stressful conditions would be very valuable. Furthermore, in Study 1, we tested the effects of the intervention after a period of 2 weeks; in Study 2, we observed whether mental contrasting showed beneficial effects already within less than 1 week after the intervention. Finally, in Study 1 students were embedded in the German educational system; in Study 2, we therefore chose to test children enrolled in a US public school.

Study 2: Mental contrasting and learning multi-lingual vocabulary in US middle school children

Method

Participants and design

Students at a middle school in a low-income urban area in the United States were recruited using implied parent consent and signed child assent procedures. A total of 63 fifth-grade students (35 female) elected to participate. As the children had just transitioned into their new school, to control for verbal capability and classroom behavior, 1 week before the start of the study, we asked teachers to assess each child's reading level using a 13-point scale ranging from A+ to F. Teachers also assessed each child's classroom behavior responding on a 1 (*Not at all true*) to 5 (*Completely true*) scale to the following item: "In general, this student behaves well." We then randomly assigned the students to one of the two intervention conditions: a mental-contrasting and a positive-future control condition. Students in both conditions were given the task to study for

a foreign language quiz and to win a cash prize. Participation was voluntary, and the training took place during school hours.

Procedure and materials

At Time 1, the interventionist explained that a game would be played involving a prize of $5. The interventionist next told the students that they would be given a study packet depicting 10 different countries with corresponding ways to say *thank you* in the language spoken in each respective country. The students were also told that 4 days later they would take a quiz testing them on the 10 different ways to say *thank you*; they would be asked to write down each way to say *thank you* under its corresponding country. The students were informed that if they succeeded in correctly identifying 5 or more words and spelling them correctly, then they would win the prize of $5.

After the general instructions and introduction to the foreign words, each participant was given a three-part booklet to be filled out in class. The first part of the booklet asked students to write their name, class, and gender. The second part of the booklet measured expectation of success and incentive value. "How sure are you that you will learn 5 or more ways to say '*thank you*' and win $5?" and "How important is it for you to learn 5 or more ways to say '*thank you*' and win $5?" The answer scales ranged from 1 (*not at all*) to 5 (*completely*).

The third part of the booklet entailed the intervention. The interventionist asked all students to identify, imagine and write about the best thing that they associated with correctly identifying the *thank you* vocabulary and winning the prize. Specifically, students were asked:

> Imagine that you learn 5 or more ways to say '*thank you*' and win $5! What would be the best thing about this?

Students in the mental-contrasting condition were then asked:

> Which of your behaviors might get in the way of learning 5 or more ways to say '*thank you*'? What in you might get in the way of studying hard?

On the contrary, participants in the positive-future control condition were asked:

> Again imagine that you learn 5 or more ways to say '*thank you*' and win $5! What would be the second best thing about this?

After the intervention, each student received a double-sided study sheet. The first side contained a world map with the names of 10 different countries indicated by arrows drawn from the location on the map to the name of the country. Next to the name of each country was a blank line. The second side was identical but with the correct way to say *thank you* filled into the blank next to the country.

The interventionist explained the words using a projector depicting the second side of the study sheet on the wall. Specifically, she explained how people say *thank you* in each country by pointing to the country, pronouncing the word for *thank you* in that country, and pointing to the word next to the country. Each student followed along by writing the foreign word into the blank next to the appropriate country on the first side of the study sheet. At the end of the first day, students were given a second study sheet that they could use to practice on their own at home. The instructor assured the students that the study sheets were theirs to keep and would not be collected. If a student lost his sheet, it would not be replaced. Two days after the intervention, the writing teacher reminded students to study for the quiz on the *thank you* vocabulary that they would be taking in 2 days. Like in Study 1, mental contrasting versus positive thinking was not reinforced at this reminder.

The 10 selected foreign words were as simple as possible (word length ranged from three to eight letters) and were in languages with which students were unlikely to be familiar (e.g., Danish tak; Russian spasiba; Japanese arigatou; Arabic shokran; Swahili asante; Portuguese obrigado). In a pilot test of 27 fifth graders at a comparable middle school, none of the students knew any of the foreign language words before receiving a study sheet with the answers. In addition, the words were examined by the teachers to ensure that all students could learn the words and win the prize if they put effort into learning the vocabulary.

At Time 2, 4 days after the intervention, to assess the dependant variable, the interventionist handed out a quiz containing all 10 countries from the multi-lingual study sheet. Each country had a blank line beneath it on which the participants were told to write the corresponding way to say *thank you* in that country. The testing was overseen by the interventionist. After completion of the quiz, those students who correctly identified 5 or more of the ways to say *thank you* in the corresponding countries received a prize of $7. Everyone else received a prize of $2 for participating. A foreign vocabulary word was given one full point when written next to the corresponding country and spelled in a way so that the word could be identified as correct, leading to a quiz score from 0 to 10.

Results

Descriptive analyses

Quiz score (range: 0–10) correlated with all predictor variables, reading level, classroom behavior, expectation, and incentive value (see Table 2).

Table 2 Correlations, Ms, and SDs for variables used in Study 2 ($N = 63$)

Variables	*M* (SD)	1	2	3	4
1. Reading level	7.94 (2.65)	–			
2. Classroom behavior	3.79 (1.08)	.21	–		
3. Expectation	3.71 (1.18)	.19	−.03	–	
4. Incentive value	4.22 (1.01)	−.01	.05	.51***	–
5. Quiz score	5.70 (2.80)	.45***	.32**	.31**	.35**

* $p < .05$; ** $p < .01$; *** $p < .001$

Randomization

There was no difference between students in the mental-contrasting condition ($n = 31$) and those in the positive-future control condition ($n = 32$) in terms of gender, reading level, classroom behavior, expectation or incentive value, all Fs (1, 61) < .37, ps > .54.

Vocabulary quiz

We estimated a General Linear Model (GLM) with quiz score as the dependent variable, condition as a fixed between-subject factor, reading level, classroom behavior, expectation, and incentive value as covariates. We observed a main effect for reading level, $F(1, 57) = 13.92$, $p < .001$, $\eta_p^2 = .20$, classroom behavior, $F(1, 57) = 4.49$, $p < .04$, $\eta_p^2 = .07$, and incentive value, $F(1, 57) = 5.40$, $p < .03$, $\eta_p^2 = .09$, with children having a higher reading level, better classroom behavior, and a higher incentive value performing better. We observed no main effect for expectation, $F(1, 57) = .45$, $p > .50$, $\eta_p^2 = .008$. Importantly, we observed a main effect for condition $F(1, 57) = 4.00$, $p = .05$, $\eta_p^2 = .07$, with participants in the mental-contrasting condition achieving better scores than those in the positive-future control condition ($M = 6.29$ vs. $M = 5.13$).

To ensure that reading level, classroom behavior, expectation, and incentive value did not moderate the condition effects on quiz score, we computed four additional analyses. Specifically, we reran the General Linear Model described above four times, testing whether there were interaction effects between condition and reading level, condition and classroom behavior, condition and expectation, or condition and incentive value. As predicted, no significant interaction effects emerged, all Fs < .31, ps > .58.

Discussion

In Study 2, we replicated the results from Study 1; mental contrasting led to better learning of foreign language words than only thinking about the positive future. Importantly, fifth graders are at a critical stage in their school career. Thus, the results imply that mental contrasting can be applied to help students achieve higher academic scores even in times of educational transitions such as switching from elementary school to middle school and starting a new school. Study 2 also showed that the beneficial effects of mental contrasting as compared to solely thinking about the positive future replicated across different cultures, language tasks, and time periods of learning. Finally, in both studies we ensured that the vocabulary task was new to the children and solvable for all children. Thus, as predicted, children benefited from mental contrasting more than from positive thinking.

General discussion

Across two brief interventions we observed that mental contrasting benefited learning in elementary school children more than only thinking about the positive future. German second and third graders and US fifth graders both in low-income areas were more successful in learning foreign language words after being taught mental contrasting, as compared to only thinking about successfully solving the language task and winning a prize. Together, Studies 1 and 2 show that mental contrasting is superior to thinking about future successes in very young elementary school children and in middle school children going through a difficult transition, shortly after the intervention and weeks later, in schools embedded in the European and the US cultural contexts, and across different language tasks (learning different words from one new language to learning one word in different new languages). Finally, the present intervention showed beneficial effects of mental contrasting for solving a standardized task in a group context, extending past research applying the self-regulatory strategy to idiosyncratic wishes in individualized contexts.

Limitations and future directions

We do not exactly know why mental contrasting was superior to only thinking about the positive future because

we did not measure children's thoughts and behavior during the time between the intervention and the quiz. We speculate that the children in the mental-contrasting condition, by juxtaposing the obstacle with the wished-for future, discovered that their obstacle to reaching the future could be overcome by effort. Previous research has shown that mental contrasting indeed leads to such insights with subsequent behavior improvements (e.g., changing bad habits of snacking; Adriaanse et al. 2010). These insights might have led the children in the mental-contrasting group rather than in the positive-future group to exert effort when learning the words. As we had ensured through the advice of the teachers that all children were able to learn the words, we assumed that quiz performance is a valid indicator of the extent to which the participants exerted effort,

In addition, by elaborating future and reality, the children might have not only discovered that effort can lead to succeeding on the quiz and winning the prize, they may have also discovered other means to improve their learning. For example, they may have used learning strategies more frequently at home or/and at school, and may have chosen more relevant ones. They might have resisted temptations and distractions more effectively, and paid more attention when the interventionist explained the words or while taking the test. They also might have had the insight that seeking help from peers and teachers would be effective. Indeed, mental contrasting of feasible wishes has been shown to increase the use of planning strategies (Oettingen et al. 2001), remedial work (Oettingen et al. 2005) as well as seeking effective help (Oettingen et al. 2010b). Thus, in future studies responses from peers and teachers may tell to what extent children who are taught mental contrasting will improve their performance by seeking help. Peer and teacher ratings may then also tell to what extent mental-contrasting effects transfer to other academic subjects. For example, in the present studies, mental-contrasting students may have become interested in other academic subjects that are more or less related to learning the foreign words (e.g., English as a foreign language in the German children, geography in the American children). Future studies may also explore to what extent mental contrasting raises wishes to strive for good grades in general. Self-report questionnaires asking for enthusiasm, liking, and standards of excellence should complement teacher ratings and students' actual performance.

Finally, by comparing the mental-contrasting condition to a positive-future control condition, we showed that mental contrasting of feasible wishes improved performance over and above what the literature on positive thinking would propose. Indeed, thoughts and images about a positive future may create an initial hype, enthusiasm, and interest in learning the words and winning the prize, especially because the task is feasible for all participants. We wanted to show that the effects of mental contrasting would be more beneficial and persist beyond an initial enthusiasm possibly created by imagining the positive future. Future intervention studies should also include a non-treatment control condition. We would expect findings in line with past research that observed the same pattern of results in the no-treatment and the positive-future control conditions as compared to the mental contrasting condition (e.g., Oettingen 2000).

Another open question is to what extent children in the two conditions may have varied in how often they used their self-regulatory strategies and what they considered opportune times for using mental contrasting. Finally, mental contrasting may have been more beneficial for some children than for others. For example, some children may have already formed the habit of using mental contrasting when confronted with learning tasks, while for others the present intervention may have been the first time applying this technique. We speculate that the latter may have been a greater benefit than the former as those students may have discovered unknown obstacles as well as appropriate means to achieve academic success.

Applied implications

The present results suggest that mental contrasting more than focusing on the desired future can be used as an effective tool for people to exert effort in academic tasks. They are in line with recent research in other areas showing beneficial effects of brief interventions of mental contrasting. Mental contrasting showed its effects despite no explicit demand on the students to practice by the interventionist or the teacher. In neither of the two studies were students given a practice sheet to hand in nor were they encouraged to show their study efforts in class. This hands-off-approach was underlined by the interventionist telling students that study sheets would not be collected or replaced. In sum, the differences in quiz performance can be interpreted to be due to the minimal differences in the very brief initial intervention (i.e., elaborating future and reality versus elaborating the future only).

The present results are in line with intervention studies conducted in the health area. For example, mental contrasting led to improved diet and exercise (Johannessen et al. 2010), and in combination with planning out when and where to act (by implementation intentions, Gollwitzer 1999), it led middle-aged adults to exercise more over a period of 4 months (Stadler et al. 2009) and eat more fruit and vegetables over 2 years (Stadler et al. 2010). Interestingly, mental contrasting with implementation intentions also helped individuals particularly in need of self-regulation, such as chronic pain patients (Christiansen et al. 2010). These findings suggest that future interventions may

want to especially focus on using mental contrasting to benefit individuals in need. The present study with children attending schools in low-income areas is an example from the educational domain.

Importantly, when mental contrasting is used as an intervention, it should be applied to wishes and tasks that participants have the capability of solving. As the present study was conducted in classroom settings and pertained to standardized tasks we needed to ensure that participating students had the capability to solve the tasks. We did so by consulting their teachers when constructing the task. This standardization of participants' wishes or tasks is an important addition to previous intervention research where we asked participants to mentally contrast their idiosyncratic wishes of high feasibility (Stadler et al. 2009, 2010). Thus, the present research unveils how mental contrasting can be used as an effective tool to heighten goal commitment on a standardized task in a group setting.

Conclusion

Schools that encourage their children to think positively about possible future successes seem to do the right thing after all—*if* they caution students to mentally contrast these future successes with the relevant obstacles of reality. Only then will students put in the effort to actually achieve future successes. So far, interventions teaching mental contrasting have shown benefits for fulfilling idiosyncratic wishes. The present cost and time effective intervention shows how mental contrasting can be applied to solve assigned learning tasks in a group setting, benefiting all members of the group without leaving any children behind.

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