Original Article

Well Self-Regulated People Use Mental Contrasting

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Abstract: Mentally contrasting a desired future with reality is a self-regulation strategy helping people manage their life by promoting selective goal pursuit: people pursue feasible futures and disengage from unfeasible ones. We investigated whether participants who effectively regulate their academic and everyday life spontaneously use mental contrasting. Indeed, students who were good self-regulators in the academic domain, as indicated by their high self-reported academic self-regulation skills, high need for achievement, and above-average grades mentally contrasted when writing about an important achievement-related wish (Study 1). So did participants who were good self-regulators in everyday life as indicated by their high self-reported generalized self-regulation skills and high need for cognition (Study 2). Results indicate that successful self-regulation is linked to spontaneous mental contrasting.

Keywords: mental contrasting, self-regulation, academic performance, need for achievement, need for cognition, five-factor personality traits

A senior student wants to get involved in an honorary school project to help first-year students adjust to college. Engaging in the project, however, conflicts with important class projects he has to finish. Conflicts between desired futures such as these frequently occur in everyday life. To resolve them, people need to prioritize their projects wisely. In case of the student, imagining how good it would feel to support the freshmen, but then also considering the obstacle of needing to study for class will help the student decide: he will actively engage in the honorary project if integrating both the honorary and the class projects seems feasible and will refrain from engaging in the honorary project if integration seems unfeasible. Such mental contrasting of a desired future with obstacles of reality is a self-regulation strategy that has been shown to promote vigorous pursuits of feasible projects and to let go of unfeasible ones. In this way, mental contrasting enables people to manage their everyday life and long-term development in an effective way (summaries by Oettingen, 2012, 2014).

Mental contrasting helps people to regulate their everyday pursuits across many domains. For example, mental contrasting helped people find a balance between work and family life (Oettingen, 2000), manage their time more effectively, make decisions more easily, and master everyday tasks (Oettingen, Mayer, & Brinkmann, 2010). It also boosted academic performance and creativity (A. Gollwitzer, Oettingen, Kirby, Duckworth, & Mayer, 2011; Oettingen, Marquardt, & Gollwitzer, 2012), promoted

physical activity and healthier eating (Johannessen, Oettingen, & Mayer, 2012; Sheeran, Harris, Vaughan, Oettingen, & Gollwitzer, 2013), and fostered cooperation and fairness (Kirk, Oettingen, & Gollwitzer, 2011; summary by Oettingen, 2012).

Previous work experimentally induced mental contrasting or taught it as a meta-cognitive strategy to investigate its effects on goal pursuit. We move beyond previous work by examining whether person attributes indicative of being well self-regulated (e.g., self-reported self-regulation skills, successful academic performance, need for achievement, and need for cognition) predict people's spontaneous use of mental contrasting. Because mental contrasting is an effective self-regulation strategy that helps people to manage their life, we assumed that people who are good at regulating their everyday endeavors would use mental contrasting as a self-regulatory tool.

Mental Contrasting

When people use mental contrasting, they first name an important personal wish from a specific domain ("getting a raise"). They then identify and imagine the best outcome associated with having realized their wish ("feeling more appreciated"). Following these two steps, they identify and imagine the crucial inner obstacle in their present reality

standing in the way of realizing their wish ("fear of being rejected"). Imagining the desired future followed by the present reality strengthens nonconscious associations between future and reality (Kappes & Oettingen, 2014) and between reality and instrumental means to overcome the reality (Kappes, Singmann, & Oettingen, 2012). It also fosters interpreting the reality as an obstacle to realizing the future (Kappes, Wendt, Reinelt, & Oettingen, 2013). These effects occur if people have high expectations of realizing the future. If they have low expectations, mental contrasting weakens future-reality associations and reality-means associations. It also prevents people from interpreting the reality as an obstacle. After mental contrasting people will actively pursue the desired future, when expectations of success are high but will let go when expectations are low.

By contrast, imagining only the desired future (indulging), only the present reality (dwelling), or imagining the reality before the future (reverse contrasting), do not modulate respective mental associations. These modes of thought also do not make people interpret the reality as an obstacle because the reality is not elaborated in the context of the desired future (Kappes et al., 2012, 2013). Therefore, mental contrasting more than those other modes of thought leads to expectancy-dependent goal pursuit and helps people select and prioritize their everyday pursuits wisely. In sum, mental contrasting is a content-independent, time- and cost-effective self-regulation tool (Oettingen, 2012). To examine the effects of mental contrasting on goal pursuit and its mechanisms previous research focused on inducing mental contrasting.

Inducing Mental Contrasting

To induce mental contrasting participants are asked to first write down their currently most important wish from a specific domain ("graduating from college"). Participants in the mental contrasting condition then write down the best outcome they associate with having fulfilled their wish ("parents would be proud") and elaborate it in writing. After that, they write down and elaborate their most critical obstacle that keeps them from fulfilling their wish ("feeling distracted from learning"). Typical control conditions involve an indulging condition (participants name and elaborate their best outcome followed by their second best outcome), a dwelling condition (participants name and elaborate their most crucial obstacle followed by their second most crucial obstacle), a reverse contrasting condition (participants name and elaborate their most crucial obstacle followed by their best outcome), or an irrelevant content control condition (participants name and elaborate content irrelevant to their wish).

The dependent variable is goal pursuit and attainment, measured by various indicators including cognitive (making plans), affective (anticipated disappointment in case of failure), motivational (determination), physiological (energy mobilization), and behavioral (grades). Mentally contrasting participants showed selective (expectancy-dependent) goal pursuit regardless of whether these indicators were self-reported or observed, measured immediately or weeks later (Oettingen, 2000; Oettingen et al., 2009; Sevincer, Busatta, & Oettingen, 2014; summaries by Oettingen, 2012; Oettingen, Sevincer, & Gollwitzer, 2008; Sevincer & Oettingen, 2015). Intervention studies have taught mental contrasting as a meta-cognitive strategy to improve time management (Oettingen et al., 2010), become physically more active (Sheeran et al., 2013), deal with chronic disease (Christiansen, Oettingen, Dahme, & Klinger, 2010), and excel in school (A. Gollwitzer et al., 2011) among others.

Measuring Mental Contrasting

Mental contrasting cannot only be induced but it can also be measured. Specifically, Sevincer and Oettingen (2013) unobtrusively observed mental contrasting in participants' stream of thought by asking them to freely think about an important wish and write down their thoughts. The texts were then content analyzed to identify participants' modes of thought. Participants who wrote about the desired future followed by present reality were identified as mentally contrasting. Those who wrote about the desired future only as indulging, those who wrote about the reality only as dwelling, and those who wrote about the reality followed by the future as reverse contrasting. Interrater reliabilities for coding participants' texts were high (between 79% and 86%), suggesting that the coding system reliably differentiated between participants' modes of thought. Moreover, supporting the validity of the measure, mental contrasting (vs. indulging, dwelling, and reverse contrasting) predicted expectancy-dependent goal pursuit just as induced mental contrasting does. In sum, the developed method is a reliable and valid measure to assess mental contrasting.

Here, we used the described measure to examine whether people who are well self-regulated use mental contrasting. To test this hypothesis, we assessed skills (self-regulation skills), needs (need for achievement and need for cognition), and behaviors (academic performance), indicative of being well self-regulated and observed whether those attributes predict mental contrasting. We examined self-regulation and the use of mental contrasting in the domain of academic achievement (Study 1) and everyday life in general (Study 2).

The Present Research: Self-Regulation and the Use of Mental Contrasting

Academic Domain

Self-regulation refers to the control of the self to overcome immediate impulses and act in one's long-term best interest (Muraven & Baumeister, 2000). It enables people to manage their lives and achieve desired outcomes. In Study 1, we investigated self-regulation and the use of mental contrasting in the academic domain because in this domain skilled self-regulation is particularly important for achieving desired outcomes. For example, self-reported self-regulation skills were related to a high grade-point average (GPA; Tangney, Baumeister, & Boone, 2004). Also, self-regulation skills, as reported by students, parents, and teachers, were a better predictor than IQ of effort and performance in school, as measured by attendance, time spent on homework, and course grades (Duckworth & Seligman, 2005). Moreover, high self-regulated learning skills predicted success in educational attainment (meta-analysis by Sitzmann & Ely, 2011; Zimmerman, 1990). Because mental contrasting is an effective self-regulation strategy that fosters academic performance (A. Gollwitzer et al., 2011), we predicted that the better students self-regulated themselves in the academic domain, the more likely they would use mental contrasting when writing about an important academic wish.

To measure self-regulation in the academic domain, we used three indicators. First, we measured self-reported self-regulation skills in achievement contexts (Schuler & Prochaska, 2001) as a straightforward indicator of self-regulation. Second, we assessed need for achievement. Need for achievement is the desire to accomplish something difficult and attain a standard of excellence (Murray, 1938/1949) and strongly predicts academic outcomes (meta-analyses by Spangler, 1992). Participants with a high need for achievement evinced longer delay of gratification (Mischel, 1961). They were also more inclined to use meta-cognitive self-regulation strategies (Bartels & Magun-Jackson, 2009) such as planning (e.g., setting subgoals), monitoring (e.g., tracking progress), and regulating cognitive processes (e.g., focusing attention). Because mental contrasting is an effective meta-cognitive self-regulation strategy in academic contexts (Oettingen, 2012) people with a high need for achievement should be more likely to use it. Third, we measured self-reported grades as a behavioral indicator of successful self-regulation (Duckworth & Seligman, 2005).

In sum, in Study 1, we hypothesized that the higher students' self-regulation, as indicated by their self-reported self-regulation skills, need for achievement, and self-reported grades, the more likely they would spontaneously use mental contrasting. Study 1 focused on the academic domain. People who are well self-regulated in one domain, however, are not necessarily so in other domains (Baumeister, Heatherton, & Tice, 1994). Therefore, Study 2 focused on self-regulation in everyday life in general.

Everyday Life

In Study 2, we measured participants' generalized self-regulation as their self-reported ability to override impulses (Tangney et al., 2004) and to effectively pursue long-term goals (Kanfer, 1970; Miller & Brown, 1991). As yet another indicator of generalized self-regulation, we measured need for cognition (Cohen, Stotland, & Wolfe, 1955). Need for cognition is the tendency to engage in and enjoy complex thinking (Cacioppo, Petty, & Kao, 1984). It is, for example, related to better attentional control (high task-focusedness), better emotion regulation (low levels of chronic anxiety and anger), and better stress management (low levels of perceived stress; meta-analysis by Cacioppo, Petty, Feinstein, & Jarvis, 1996). Moreover, people high (vs. low) in need for cognition use effective problem-solving strategies (Nair & Ramnarayan, 2000) and refrain from employing ineffective strategies, such as avoidant coping (Berzonsky, 1992). They are also inclined to employ meta-cognition (Cazan & Indreica, 2014; Petty, Briñol, Tormala, & Wegener, 2007) which is a hallmark of effective self-regulation (Gollwitzer & Schaal, 1998; Kaplan, 2008). Finally, they tend to engage in effortful cognitive processing (Cacioppo et al., 1996; Petty, Briñol, Loersch, & McCaslin, 2009). Because mental contrasting is an effective meta-cognitive problem-solving strategy that requires cognitive effort (Achtziger, Fehr, Oettingen, Gollwitzer, & Rockstroh, 2009; Oettingen, 2012), people high in need for cognition should be more likely to use it.

In sum, in Study 2, we hypothesized that the higher participants' generalized self-regulation, as indicated by their self-reported ability to override impulses, their self-reported ability to effectively pursue long-term goals, and their need for cognition, the more likely they would spontaneously use mental contrasting.

Overview

We conducted two cross-sectional correlational studies to test whether participants who are effective self-regulators use mental contrasting. Study 1 focused on the academic domain. Specifically, we measured self-reported academic

self-regulation skills, need for achievement, and self-reported grades. Study 2 focused on self-regulation in everyday life more broadly. We measured two facets of generalized self-reported self-regulation skills (impulse control and the pursuit of long-term goals) and need for cognition. For exploratory reasons, we also assessed the five-factor personality dimensions. To assess the use of mental contrasting, we used the content-analytic method by Sevincer and Oettingen (2013).

Study 1: Self-Regulation in the Academic Domain

We tested whether students who are effective self-regulators in the academic domain as indicated by their self-reported self-regulation skills, need for achievement, and self-reported grades would be more likely to apply mental contrasting when writing about an important academic wish.

Method

Participants and Design

The online questionnaire was completed by 196 students (143 female, M_{age} = 24.46 years, SD = 5.78) from a large German university. To determine sample size, we followed the recommendation by Fraley and Marks (2007). Given a typical effect size of r = .21 (d = .43) in studies involving personality variables, to detect such an effect with high power (80%), we would need about 200 participants. The study was advertised on campus as about how students think about school. Participation was voluntary, and students could win gift cards. We used a cross-sectional, correlational design.

Self-Regulation Skills in the Academic Domain

Students completed the short form of the Achievement Motivation Inventory (LMI-K; Schuler & Prochaska, 2001). The LMI-K measures self-regulation skills in academic and professional contexts and has high reliability and discriminant as well as convergent validity. It is frequently used in applied contexts (selection of personnel) and research on personality and motivation (Hülsheger & Maier, 2008). The short LMI-K consists of 30 items using 7-point scales ranging from 1 (= *strongly disagree*) to 7 (= *strongly agree*). Following Schuler and Prochaska (2001), we averaged the 30 items into an index of academic self-regulation skills (α = .92).

Need for Achievement

Students completed the achievement scale of the Personality Research Form (PRF; Jackson, 1984; Stumpf, Angleitner,

Wieck, Jackson, & Bieloch-Till, 1985). This questionnaire has high reliability and convergent validity and is widely used in motivational and educational research. It consists of 16 statements with a true/false format ("I don't bother working while others have fun"). The items were summed to yield an index of need for achievement (Stumpf et al., 1985). We calculated internal consistency using the Kuder-Richardson formula for dichotomous items (α = .61).

Self-Reported Grades

Students reported their high-school diploma grade ("What high-school diploma grade did you attain?") and their current university GPA ("What is your current grade point average at university?"). Self-reported grades highly correlate with actual grades (Hattie, 2009).

Assessing Mental Contrasting

We followed the procedure by Sevincer and Oettingen (2013). Students first named their currently most important wish in the academic domain ("Which personal wish directed at academic achievement is presently most on your mind?"). They named, for example, "finish my bachelor's thesis." Following Sevincer, Kluge, and Oettingen (2014), and Sevincer, Schlier, and Oettingen (2015), students then indicated their expectations of success (How likely do you think it is that you will fulfil your wish?) and the incentive value of their wish (How important is it to you to fulfill your wish?). We used 7-point scales ranging from 1 (= *not at all*) to 7 (= *very*). We measured expectations and incentive value to verify that students named wishes that are important to them and that the hypothesized pattern remains robust over and above expectations and incentive value.

Students then read:

> "Now we would like you to think about your achievement-related wish. You are free to think about whatever aspects come to your mind that are related to your wish. Let the mental images pass by in your thoughts and do not hesitate to give your thoughts and images free rein. Write down what comes to your mind in the box below."

To assess students' mode of thought, two independent raters first segmented the texts into statements (Sevincer & Oettingen, 2013). For the students who wrote a coherent text, we defined a statement as at least one subject-predicate sequence or more. Interrater agreement was 88%. If the raters disagreed, we coded the larger number of statements. Of the 196 students, 17 (9%) did not write a coherent text but listed only keywords (e.g., "writing," "stress"). For those students, each keyword was considered as one statement.

After that, the raters coded each statement into one of three categories: (a) desired future, (b) present reality,

Table 1. Study 1: summary of intercorrelations, means, and standard deviations for self-regulation skills in the academic domain, need for achievement, and self-reported grades

Measure	1	2	3	4	M	SD
Self-regulation skills						
1. Achievement Motivation Inventory (LMI-K)	–				4.78	0.76
Need for achievement						
2. Achievement scale (PRF)	.59*	–			10.75	2.67
Self-reported grades (reverse coded)[a]						
3. High-school diploma grade	.22*	.23	–		5.03	0.63
4. Current university GPA	.29*	.30*	.13	–	5.00	0.59
Mental contrasting (vs. not)[b]	.16*	.24*	.21*	.12		

Notes. [a]In Germany grades range from 1 (= *best*) to 6 (= *worst*). [b]Point-biserial correlations with the dummy-coded mental contrasting variable. $*p < .05$.

or (c) other. Statements coded as "desired future" included descriptions of desired future events and consequences of realizing the desired future, such as feelings, material and nonmaterial gains, and improvements in the current situation. Statements coded as "present reality" included descriptions of the reality and obstacles to realizing the desired future. Statements coded as "other" included ambiguous statements, statements about past events, the self in general, and the experimental situation. See Sevincer and Oettingen (2013), for examples of segmentation and coding. Interrater agreement was 89% (κ = .84). Regarding the total number of statements on which raters disagreed (11%), for 37% of these statements agreement could be reached through discussion. For the remaining 63%, an agreement could not be reached. In this case, the respective statement was coded as "other."

A student was classified as mentally contrasting if the student generated at least one statement about the desired future and at least one statement about the present reality, mentioning the future first. If the reality was mentioned first, the student was classified as reverse contrasting. A student was classified as indulging if the student generated at least one statement about the future but none about the reality and as dwelling if the student generated at least one statement about the reality but none about the future. If a student generated only statements categorized as "other," we did not include the student in the above categories. To conclude, students completed a demographic questionnaire[1] and were fully debriefed.

Results

Descriptive Analyses
Table 1 provides a summary of the intercorrelations, means, and standard deviations for self-regulation skills, need for achievement, and self-reported grades.

Expectations and Incentive Value
Students' expectations (M = 5.76, SD = 1.17) and incentive value (M = 6.46, SD = 0.87) were above the midpoint of the 7-point scale, indicating they named wishes they considered feasible and important. Expectations and incentive value correlated positively, $r = .48$, $p < .001$. To assure that our hypothesized pattern is not due to variations in expectations and incentive value, we controlled for these variables in our analyses.

Modes of Thought
Forty-four students (22%) mentally contrasted, 59 (30%) indulged, 52 (27%) dwelled, and 33 (17%) reverse contrasted. Eight (4%) generated only statements categorized as "other." Following Sevincer and Oettingen (2013), the latter eight students were excluded from the analyses.

Number of Statements
On average, students generated 8.11 (SD = 5.32) statements. The average number of statements differed between the four modes of thought, $F(3, 184) = 9.75$, $p < .001$. Mentally contrasting students generated the most statements (M = 11.11, SD = 6.56), followed by reverse contrasting (M = 9.42, SD = 5.30), dwelling (M = 6.94, SD = 4.46), and indulging students (M = 6.29, SD = 3.67). To verify that our hypothesized pattern is not due to variations in the number of statements, we controlled for the number of statements.

Self-Regulation Skills in the Academic Domain
To test our hypothesis that the higher students' self-regulation skills, the more likely they would use mental contrasting (vs. not), we first dummy-coded the categorical mode of thought variable into mental contrasting (0) versus indulging, dwelling, and reverse contrasting combined (1). Hierarchical binary logistic regression analyses with the dummy-coded mental contrasting variable as the

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[1] In Study 1, we also measured promotion/prevention focus (Higgins, 1997; Lockwood, Jordan, & Kunda, 2002) and action versus state orientation (Kuhl & Beckmann, 1994). Because these measures were assessed for exploratory reasons, we did not discuss them here. The exhaustive study materials of both studies are available in the Electronic Supplementary Materials, ESM 1 and 2.

Table 2. Study 1: summary of hierarchical binary logistic regression analyses for the principal variables (self-regulation skills, need for achievement, high-school diploma grades, current university GPA) and control variables (expectations, incentive value, and the number of statements) predicting the dummy-coded mental contrasting variable (mental contrasting vs. not)

Predictor	ΔR^2	B	SE B	OR	p	95% CI
Self-regulation skills						
Step 1	.04*					
Achievement Motivation Inventory		0.52	.24	1.69	.029	[1.06, 2.70]
Step 2	.10*					
Achievement Motivation Inventory		0.51	.26	1.67	.046	[1.01, 2.76]
Expectations		−0.04	.20	0.97	.860	[0.66, 1.42]
Incentive value		0.07	.27	1.07	.810	[0.63, 1.83]
Statements		0.12	.03	1.13	.000	[1.06, 1.20]
Need for achievement						
Step 1	.09*					
Achievement scale (PRF)		0.250	.08	1.28	.001	[1.10, 1.49]
Step 2	.13*					
Achievement scale (PRF)		0.290	.08	1.34	.000	[1.14, 1.58]
Expectations		0.001	.20	1.00	.990	[0.67, 1.49]
Incentive value		0.108	.28	1.11	.700	[0.65, 1.92]
Statements		0.140	.04	1.15	.001	[1.07, 1.23]
High-school diploma grades (reverse coded)						
Step 1	.07*					
High-school diploma grade		0.83	.33	2.29	.011	[1.21, 4.35]
Step 2	.14*					
High-school diploma grade		0.96	.36	2.61	.008	[1.29, 5.28]
Expectations		−0.09	.21	0.92	.690	[0.61, 1.39]
Incentive value		0.08	.29	1.08	.790	[0.61, 1.92]
Statements		0.14	.04	1.15	.000	[1.07, 1.24]
Current university GPA						
Step 1	.02					
Current university GPA		0.52	.36	1.69	.150	[0.83, 3.44]
Step 2						
Current university GPA	.09*	0.47	.39	1.59	.230	[0.75, 3.39]
Expectations		−0.12	.22	0.88	.580	[0.58, 1.36]
Incentive value		0.16	.30	1.16	.590	[0.65, 2.11]
Statements		0.10	.04	1.11	.005	[1.03, 1.19]

Note. *p < .05.

dependent variable and the continuous LMI-K score as predictor in the first step yielded that, as hypothesized, the higher students' self-regulation skills, the more likely they used mental contrasting. Of the one-third of students with the highest scores, 32% mentally contrasted, compared to 17% of the one-third with the lowest scores. When we added expectations, incentive value, and the number of statements as predictors in the second step high self-regulation skills continued to predict mental contrasting. Thus, the pattern was robust when controlling for the added variables. See Table 2 for a summary of this

hierarchical binary logistic regression analysis and all following ones.

We conducted follow-up analyses to explore the use of mental contrasting as compared to each of the other modes of thought (indulging, dwelling, and reverse contrasting). Specifically, we conducted multinomial regression analyses with the categorical mode of thought variable as the dependent variable, the continuous LMI-K score as predictor, and mental contrasting as reference category. The overall model was significant, $p = .019$, $R^2 = .056$,[2] indicating that self-regulation skills predicted mode of thought. The higher

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[2] All R^2 reported in this article are Nagelkerke's.

students' self-regulation skills, the more likely they used mental contrasting versus dwelling, OR = 2.35,[3] p = .003, 95% CI [1.33, 4.16]. Self-regulation skills did not predict mental contrasting versus indulging, p = .29, 95% CI [0.78, 2.29], and versus reverse contrasting, p = .14, 95% CI [0.85, 2.95]. We conducted analogous analyses for need for achievement and self-reported grades.

Need for Achievement

Hierarchical binary logistic regression analyses yielded that, as hypothesized, the higher students' need for achievement, the more likely they used mental contrasting (vs. not). Of the one-third of students with the highest scores, 33% used mental contrasting, compared to 9% of the one-third with the lowest scores. The pattern remained significant when we added expectations, incentive value, and the number of statements (Table 2).

Follow-up multinomial regression analyses indicated that need for achievement predicted mode of thought, p < .001, R^2 = .10. The higher students' need for achievement the more likely they used mental contrasting versus indulging, OR = 1.19, p = .046, 95% CI [1.00, 1.41], dwelling, OR = 1.43, p < .001, 95% CI [1.19, 1.70], and reverse contrasting, OR = 1.26, p = .016, 95% CI [1.05, 1.53].

Self-Reported Grades

Because in Germany, grades range from 1 (= *best*) to 6 (= *worst*), we reverse coded grades. Our two indicators of self-reported grades (high-school diploma grades and university GPA) did not correlate, r = .13, p = .12. Thus, we analyzed the two indicators separately.

High-School Diploma Grades

Hierarchical binary logistic regression analyses yielded that, as hypothesized, the better students' grades, the more likely they mentally contrasted (vs. not). Of the one-third of students with the best grades, 37% used mental contrasting, compared to 14% of the one-third with the lowest grades. The pattern remained significant when we added expectations, incentive value, and the number of statements (Table 2).

Follow-up multinomial regression analyses indicated that high-school diploma grades predicted mode of thought, p = .024, R^2 = .06. The better students' grades the more likely they used mental contrasting versus indulging, OR = 2.45, p = .019, 95% CI [1.16, 5.18] and dwelling, OR = 2.74, p = .007, 95% CI [1.32, 5.68]. Grades did not predict mental contrasting versus reverse contrasting, p = .31, 95% CI [0.67, 3.53].

Current University GPA

Hierarchical binary logistic regression analyses yielded that current university GPA did not predict mental contrasting (vs. not; Table 2). It remained nonsignificant when we added expectations, incentive value, and the number of statements (Table 2).

Discussion

Students who reported higher rather than lower self-regulation skills in the academic domain were more likely to mentally contrast about their currently most important academic wish. Apparently, students who are good in managing school-related activities used mental contrasting. Moreover, students with a high need for achievement and those with high self-reported high-school diploma grades used mental contrasting. The correlational design of our studies does not allow testing causality or mediation (Maxwell & Cole, 2007). We speculate, however, that students with a high need for achievement may use effective self-regulation tools, such as mental contrasting, which in turn may foster their academic achievement. We will return to this point in the General Discussion.

The patterns remained robust over and above students' expectations of success, their incentive value, and the number of statements generated. Effect sizes were small to medium (ORs transformed to ds: between .14 and .44; Cohen, 1988). As for the follow-up analyses that explored the use of mental contrasting versus each of the other modes of thought, for mental contrasting versus indulging two of three comparisons were significant (need for achievement and high-school diploma grades). For the comparison with dwelling all three comparisons were significant, and for the comparison with reverse contrasting one of three comparisons (need for achievement) was significant. We calculated the power of Study 1, however, to test the hypothesis that people with high self-regulation skills would be more likely to use mental contrasting rather than not. Therefore, the power was low to detect differences in the relation between self-regulation skills, need for achievement, and high-school diploma grades with mental contrasting versus each of the other modes of thought. Thus, it is not surprising that not all follow-up comparisons reached significance. All comparisons were in the predicted direction, however. Moreover, because low power may increase the risk of false positive findings (Button et al., 2013) the observed differences in the use

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[3] Odds ratios (ORs) represent the likelihood that participants use mental contrasting with an increase in the predictor variable. For example, the OR of 2.35 for the relation between academic self-regulation skills and the use of mental contrasting as compared to dwelling means that with an increase in participants' scores on the Achievement Motivation Inventory (LMI-K), the likelihood that participants use mental contrasting (vs. dwelling) is 2.35 times as high.

of mental contrasting versus each of the other modes of thought should be interpreted with caution. Study 1 focused on self-regulation in the academic domain. Study 2, in contrast, focused on self-regulation in other domains as well.

Study 2: Self-Regulation in Everyday Life

We measured self-regulation skills of everyday life. We conceptualized self-regulation skills as the ability to override impulses (Tangney et al., 2004) and effectively pursue long-term goals (Kanfer, 1970; Miller & Brown, 1991). Moreover, because need for cognition indicates effective self-regulation we also assessed need for cognition (Cacioppo et al., 1996). We predicted that the higher participants' self-regulation, as indicated by their ability to override impulses, to pursue long-term goals, and their need for cognition, the more likely they would use mental contrasting. Finally, for exploratory purposes, because the five-factor model of personality is currently the most widely accepted model of personality, participants completed the Five Factor Personality Test (Costa & McCrea, 1989).

Method

Participants and Design

Study 2 used a different student sample than Study 1. Specifically, 201 students (146 female, M_{age} = 25.00 years, SD = 6.00) from universities in Germany completed the online questionnaire. We determined sample size as in Study 1. We advertised the study on several websites for students (e.g., in Facebook groups) as a study on life tasks and personality. Participation was voluntary, and participants could win gift cards. The study used a cross-sectional, correlational design.

Self-Regulation Skills

Brief Self-Control Scale (BSCS)
We used the German version of the BSCS (Renner, Salewski, Strohbach, & Sproesser, 2009). The BSCS measures people's ability to override, change, or interrupt inner responses and behavioral tendencies. The scale has high reliability and validity (Tangney et al., 2004) and is widely used to measure self-control skills. It consists of 13 items ("I am good at resisting temptation") on a 5-point scale ranging from 1 (= *not at all*) to 5 (= *very much*). Following Tangney et al. (2004), we averaged the items into one index of ability to override impulses (α = .77).

Short Self-Regulation Questionnaire
Whereas the BSCS focuses on overriding impulses, researchers have also emphasized other aspects of self-regulation such as people's ability to plan, initiate, and maintain goal-directed behavior (Kanfer, 1970; Miller & Brown, 1991). To capture this aspect, participants completed the Short Self-Regulation Questionnaire (SSRQ; Brown, Miller, & Lawendowski, 1999; Carey, Neal, & Collins, 2004). The scale has high reliability and validity. It consists of 31 items ("Once I have a goal, I can usually plan how to reach it") with a 5-point scale ranging from 1 (= *strongly disagree*) to 5 (= *strongly agree*). Following Brown et al. (1999), we combined the items into one index of ability to effectively pursue long-term goals (α = .91).

Need for Cognition

We used the German version of the Need for Cognition Scale (NCS; Bless, Waenke, Bohner, Fellhauer, & Schwarz, 1994; Cacioppo et al., 1984). The scale consists of 18 items ("I find satisfaction in deliberating hard and long for hours"). Participants responded on a 7-point scale ranging from −3 (= *strong disagreement*) to 3 (= *strong agreement*). Following Cacioppo et al. (1984), we combined the items into an index of need for cognition (α = .87).

Five Factor Personality Test

We used a German short version of the Five Factor Personality Test (NEO-FFI; Körner et al., 2008). The questionnaire consists of five subscales. Each subscale assesses one dimension of the five-factor model (Costa & McCrea, 1989). We averaged participants' scores of the six items in each subscale to one index for each dimension. Reliabilities (αs) of the subscales were: extraversion (.74), openness to experience (.77), conscientiousness (.72), neuroticism (.85), and agreeableness (.66).

Assessing Mental Contrasting

We used the same procedure as in Study 1. Participants first named their currently most important achievement-related wish and indicated their expectations of success and incentive value using the same instructions and items as in Study 1. After that, participants freely wrote about their wish, again using the same instructions as in Study 1. We content analyzed their texts using the coding scheme by Sevincer and Oettingen (2013). Interrater agreement for the segmentation into statements was 92%. Of the 201 participants, 18 (9%) listed only keywords. For the coding of the statements into categories, the agreement was 84% (κ = .75). Regarding the total number of statements on which raters disagreed (16%), for 59% of these statements an agreement could be reached through discussion. For the remaining 41% agreement could not be reached. Thus, we coded these statements into the category "other."

Table 3. Study 2: summary of intercorrelations, means, and standard deviations for self-regulation skills, need for cognition, and the five-factor personality dimensions

Measure	1	2	3	4	5	6	7	8	M	SD
Self-regulation skills										
1. Brief Self-Control Scale (BSCS)	–								3.25	0.53
2. Short Self-Regulation Questionnaire (SSRQ)	.68*	–							3.79	0.46
Need for cognition										
3. Need for Cognition Scale (NCS)	.27*	.52*	–						5.10	0.87
Five-factor personality dimensions										
4. Extraversion	.04	.29*	.22*	–					3.35	0.63
5. Openness to experience	.05	.19*	.40*	.10	–				3.76	0.72
6. Conscientiousness	.62*	.62*	.26*	.25*	.04	–			3.93	0.57
7. Neuroticism	−.36*	−.50*	−.34*	−.41*	−.04	−.34*	–		2.74	0.83
8. Agreeableness	.27*	.31*	.16*	.21*	.06	.33*	.16*	–	3.85	0.61
Mental contrasting (vs. not)[a]	.16*	.21*	.17*	.17*	.12	.14*	−.13*	.07		

Notes. [a]Point-biserial correlations with the dummy-coded mental contrasting variable. *$p < .05$.

Results

Descriptive Analyses
Table 3 provides a summary of the intercorrelations, means, and standard deviations of self-regulation skills, need for cognition, and the five-factor personality dimensions.

Expectations and Incentive
Expectations ($M = 5.43$, $SD = 1.22$) and incentive value ($M = 6.49$, $SD = 0.84$) were above the midpoint of the 7-point scale, indicating that participants named wishes they considered feasible and important. Expectations and incentive value correlated positively ($r = .20$, $p = .005$). As in Study 1, we controlled for these variables.

Modes of Thought
Twenty-nine participants (14%) mentally contrasted, 21 (10%) indulged, 94 (47%) dwelled, and 40 (20%) reverse contrasted. Seventeen participants (9%) generated only statements categorized as other. As in Study 1, we excluded these latter participants from the analyses.

Number of Statements
On average, participants generated 6.69 ($SD = 3.74$) statements. The average number of statements differed between the modes of thought, $F(3, 180) = 5.36$, $p = .001$. Reverse contrasting participants generated the most statements ($M = 8.43$, $SD = 4.08$), followed by mentally contrasting ($M = 7.14$, $SD = 4.18$), and dwelling participants ($M = 6.19$, $SD = 3.28$). Indulging participants generated the least statements ($M = 5.00$, $SD = 3.23$). As in Study 1, we controlled for the number of statements.

Self-Regulation Skills
Brief Self-Control Scale
We conducted analogous analyses as in Study 1. To test our hypothesis that the higher participants' self-regulation skills, the more likely they would use mental contrasting (vs. not), we first dummy-coded the categorical mode of thought variable into mental contrasting (0) vs. indulging, dwelling, and reverse contrasting combined (1). Hierarchical binary logistic regression analyses with the dummy-coded mental contrasting variable as the dependent variable and the continuous BSCS score as predictor in the first step yielded that, as hypothesized, the higher participants' self-regulation skills, the more likely they used mental contrasting (vs. not). Of the one-third of participants with the highest scores, 23% used mental contrasting, compared to 12% of the one-third with the lowest scores. When we added expectations, incentive value, and the number of statements as predictors in the second step, high self-regulation skills tended to predict the use of mental contrasting. Table 4 provides a summary of this hierarchical binary logistic regression analyses and all following ones.

As in Study 1, we conducted follow-up analyses to explore the use of mental contrasting as compared to each of the other modes of thought. Specifically, we conducted multinomial regression analyses with the categorical mode of thought variable as the dependent variable, the continuous BSCS score as predictor, and mental contrasting as reference category. BSCS score predicted mode of thought, $p = .032$, $R^2 = .052$. The higher participants' score the more likely they used mental contrasting versus indulging (marginally), $OR = 2.99$, $p = .057$, 95% CI [0.97, 9.21], and dwelling, $OR = 3.00$, $p = .013$, 95% CI [1.26, 7.12].

Table 4. Study 2: summary of hierarchical binary logistic regression analyses for the principal variables (Brief Self-Control Scale, Short Self-Regulation Questionnaire, and need for cognition) and control variables (expectations, incentive value, and number of statements) predicting the dummy-coded mental contrasting variable (mental contrasting vs. not)

Predictor	ΔR^2	B	SE B	OR	p	95% CI
		Self-regulation skills (BSCS)				
Step 1	.06*					
Brief Self-Control Scale		1.00	.43	2.73	.020	[1.17, 6.34]
Step 2	.07*					
Brief Self-Control Scale		0.82	.44	2.27	.061	[0.96, 5.36]
Expectations		0.49	.21	1.63	.020	[1.08, 2.46]
Incentive value		−0.35	.23	0.70	.130	[0.44, 1.11]
Statements		0.06	.06	1.06	.290	[0.95, 1.18]
		Self-regulation skills (SSRQ)				
Step 1	.10*					
Short Self-Regulation Questionnaire		1.64	.54	5.13	.002	[1.79, 14.73]
Step 2	.07*					
Short Self-Regulation Questionnaire		1.53	.56	4.64	.006	[1.55, 13.86]
Expectations		0.49	.21	1.64	.022	[1.08, 2.49]
Incentive value		−0.36	.24	0.70	.120	[0.44, 1.10]
Statements		0.07	.06	1.07	.210	[0.96, 1.20]
		Need for cognition				
Step 1	.06*					
Need for Cognition Scale		0.65	.27	1.92	.014	[1.14, 3.23]
Step 2	.09*					
Need for Cognition Scale		0.66	.28	1.93	.018	[1.12, 3.31]
Expectations		0.55	.21	1.73	.010	[1.14, 2.63]
Incentive value		−0.40	.24	0.67	.092	[0.42, 1.07]
Statements		0.07	.06	1.07	.220	[0.96, 1.19]

Note. *p < .05.

BSCS score did not predict mental contrasting versus reverse contrasting, p = .44, 95% CI [0.56, 3.84]. We conducted analogous analyses for all following variables.

Short Self-Regulation Questionnaire
Hierarchical binary logistic regression analyses yielded that, as hypothesized, the higher participants' self-regulation skills, the more likely they used mental contrasting (vs. not). Of the one-third of participants with the highest SSRQ scores, 24% used mental contrasting, compared to 10% of the one-third with the lowest scores. The pattern remained significant when we added expectations, incentive value, and the number of statements (Table 4).

Follow-up multinomial regression analyses indicated that SSRQ score predicted mode of thought, p < .001, R^2 = .10. The higher participants' score the more likely they used mental contrasting versus indulging, OR = 5.80, p = .011, 95% CI [1.49, 22.54], and dwelling, OR = 5.11, p = .003, 95% CI [1.76, 14.81]. SSRQ score did not predict mental contrasting versus reverse contrasting, p = .13, 95% CI [0.77, 8.01].

Need for Cognition
Hierarchical binary logistic regression analyses yielded that, as hypothesized, the higher participants' NCS score, the more likely they used mental contrasting (vs. not). Of the one-third of participants with the highest scores, 20% used mental contrasting, compared to 14% of the one-third with the lowest scores. The pattern remained significant when we added expectations, incentive value, and the number of statements (Table 4).

Follow-up multinomial regression analyses indicated that NCS score predicted mode of thought, p = .008, R^2 = .07. The higher participants' score the more likely they were to use mental contrasting versus dwelling, OR = 2.14, p = .005, 95% CI [1.25, 3.64]. NCS score did not predict mental contrasting versus indulging, p = .14, 95% CI [0.84, 3.33], and reverse contrasting, p = .47, 95% CI [0.69, 2.26].

Five Factor Personality Inventory
Extraversion
Hierarchical binary logistic regression analyses yielded that the more extraverted participants were, the more likely they

Table 5. Study 2: summary of hierarchical binary logistic regression analyses for the five-factor personality dimensions (extraversion, openness to experience, conscientiousness, neuroticism, agreeableness) and the control variables (expectations, incentive value, and the number of statements) predicting the dummy-coded mental contrasting variable (mental contrasting vs. not)

Predictor	ΔR^2	B	SE B	OR	p	95% CI
			Extraversion			
Step 1	.05*					
Extraversion		0.81	.35	2.24	.022	[1.13, 4.47]
Step 2	.10*					
Extraversion		0.85	.36	2.34	.018	[1.16, 4.72]
Expectations		0.62	.22	1.86	.005	[1.21, 2.85]
Incentive value		−0.34	.24	0.71	.150	[0.44, 1.14]
Statements		0.06	.06	1.06	.260	[0.96, 1.19]
			Openness to experience			
Step 1	.04*					
Openness to experience		0.60	.32	1.82	.059	[0.98, 3.37]
Step 2	.10*					
Openness to experience		0.69	.34	2.00	.039	[1.04, 3.87]
Expectations		0.61	.22	1.84	.005	[1.20, 2.81]
Incentive value		−0.41	.24	0.67	.084	[0.42, 1.06]
Statements		0.06	.06	1.06	.270	[0.95, 1.19]
			Conscientiousness			
Step 1	.03					
Conscientiousness		0.64	.39	1.89	.099	[0.89, 4.04]
Step 2	.09*					
Conscientiousness		0.62	.41	1.86	.130	[0.84, 4.12]
Expectations		0.54	.21	1.72	.009	[1.14, 2.59]
Incentive value		−0.41	.24	0.66	.080	[0.41, 1.05]
Statements		0.05	.06	1.05	.350	[0.95, 1.17]
			Neuroticism			
Step 1	.04*					
Neuroticism		−0.54	.27	0.58	.044	[0.34, 0.99]
Step 2	.08*					
Neuroticism		−0.45	.28	0.64	.106	[0.37, 1.10]
Expectations		0.52	.21	1.68	.014	[1.11, 2.54]
Incentive value		−0.32	.23	0.72	.160	[0.46, 1.14]
Statements		0.07	.06	1.07	.220	[0.96, 1.20]
			Agreeableness			
Step 1	.01					
Agreeableness		0.32	.35	1.37	.370	[0.68, 2.74]
Step 2	.09*					
Agreeableness		0.24	.38	1.27	.530	[0.61, 2.65]
Expectations		0.56	.21	1.75	.007	[1.17, 2.61]
Incentive value		−0.36	.23	0.70	.120	[0.44, 1.10]
Statements		0.05	.06	1.05	.390	[0.94, 1.17]

Note. *p < .05.

mentally contrasted (vs. not). The pattern remained significant when we added expectations, incentive value, and the number of statements in the second step. Table 5 provides a summary of the hierarchical binary logistic regression analyses for extraversion and the other four five-factor dimensions.

Follow-up multinomial regression analyses indicated that extraversion did not predict mode of thought, p = .108, R^2 = .04. However, the more extraverted participants were the more likely they used mental contrasting versus dwelling, OR = 2.10, p = .039, 95% CI [1.04, 4.26] and reverse contrasting, OR = 2.60, p = .022, 95% CI [1.15, 5.87].

Extraversion did not predict mental contrasting versus indulging, $p = .23$, 95% CI [0.70, 4.54].

Openness to Experience

Hierarchical binary logistic regression analyses yielded that the more open to experience participants were the more likely they tended to mentally contrast (vs. not). High openness predicted mental contrasting when we added expectations, incentive value, and the number of statements in the second step (Table 5).

Follow-up multinomial regression analyses indicated that openness to experience did not predict mode of thought, $p = .25$, $R^2 = .02$. However, the more open to experience participants were the more likely they tended to use mental contrasting versus indulging, $OR = 2.01$, $p = .083$, 95% CI [0.91, 4.47], and reverse contrasting, $OR = 1.82$, $p = .091$, 95% CI [0.91, 3.64]. Openness to experience did not predict mental contrasting versus dwelling, $p = .22$, 95% CI [0.79, 2.74].

Conscientiousness

Hierarchical binary logistic regression analyses yielded that the more conscientious participants were, the more likely they tended to mentally contrast (vs. not). When we added expectations, incentive value, and the number of statements, conscientiousness ceased to predict mental contrasting (Table 5). This pattern suggests that the marginally significant relation between conscientiousness and mental contrasting was in part due to variations in the control variables – expectations, incentive value, and the number of statements.

Neuroticism

Hierarchical binary logistic regression analyses yielded that the less neurotic participants were, the more likely they mentally contrasted (vs. not). The pattern ceased to be significant when we added expectations, incentive value, and the number of statements (Table 5).

Agreeableness

Hierarchical binary logistic regression analyses yielded that agreeableness did not predict mental contrasting (vs. not). The pattern remained nonsignificant when we added expectations, incentive value, and the number of statements (Table 5).

Discussion

Participants who were well self-regulated in everyday life as measured by their ability to override impulses and pursue long-term goals, and their need for cognition, used mental contrasting when writing about their currently most important achievement-related wish. Consistent with Study 1,

those who reported being particularly able in regulating their thoughts and behavior were also those who used mental contrasting.

As in Study 1, the patterns remained significant over and above expectations, incentive value, and the number of statements, suggesting that the results are unlikely due to variations in these variables. The effect sizes were medium to large (ORs transformed to ds: between .36 and .90). As for the follow-up analyses that explored the use of mental contrasting versus each of the other modes of thought, for mental contrasting versus indulging two of three comparisons were significant or nearly significant (the BSCS marginally, and the SSRQ). For the comparison with dwelling, all three comparisons were significant. For the comparison with reverse contrasting, none of the single comparisons reached significance. Because as in Study 1, the power was low to detect differences in the use of mental contrasting versus each of the other modes of thought, the results of the follow-up analyses should be interpreted with caution. Importantly, all comparisons were in the predicted direction.

Finally, when we explored the relation of the five-factor personality dimensions with the use of mental contrasting, we observed that high extraversion and high openness to experience (marginally) predicted mental contrasting. Moreover, high conscientiousness (marginally) and low neuroticism predicted mental contrasting although the relations ceased to be significant when we controlled for expectations, incentive value, and the number of statements. We will return to this point in the General Discussion.

General Discussion

We asked whether participants who are well self-regulated in their academic pursuits and everyday life in general used mental contrasting. Indeed, in Study 1, students who were effective self-regulators in the academic domain, as indicated by their high self-reported academic self-regulation skills, need for achievement, and school grades, used mental contrasting when writing about an important achievement-related wish. In Study 2, participants who were good at mastering their everyday life, as indicated by their high self-reported impulse control, effective pursuit of long-term goals, and high need for cognition used mental contrasting. In sum, we measured self-reported skills, needs, and behaviors indicative of successful self-regulation and consistently found that good self-regulation was related to the use of mental contrasting.

Our research goes beyond previous work on the effects of mental contrasting on goal pursuit by illuminating how well-established psychological concepts (self-regulation

skills, need for achievement, need for cognition) relate to the use of mental contrasting. We also explored the relation of the five-factor personality traits with mental contrasting. We observed that participants with an extraverted personality, those high on openness to experience, those high on conscientiousness, and those low on neuroticism tended to use mental contrasting.

Because we unobtrusively observed participants' modes of thought in their written texts, we do not know whether the participants initiated mental contrasting as a self-regulation strategy or whether they spontaneously associated the desired future with the present reality. Previous research suggests that both processes may occur. On the one hand, confronting participants with a goal-relevant task (Sevincer et al., 2015; Study 2) and inducing a sad (vs. happy) mood that indicates the presence of a problem (H. B. Kappes, Oettingen, Mayer, & Maglio, 2011) fostered mental contrasting. These findings suggest that people indeed use mental contrasting as a purposeful problem-solving strategy. On the other hand, priming participants with the future and reality also fostered mental contrasting (Sevincer et al. 2015; Study 1), suggesting that activating these concepts leads people to connect the desired future with the present reality. With regard to the present finding that well self-regulated participants used mental contrasting, it seems likely that these participants, at least in part, initiated mental contrasting as a conscious strategy.

Our cross-sectional correlational design does not allow drawing directional causal inferences. Thus, in principle, it is possible that mental contrasting fostered the assessed person attributes. However, given that we measured a one-time use of mental contrasting about an achievement-related wish, it seems implausible that mental contrasting affected such relatively long-lasting attributes as skills, needs, and traits. This possibility seems even more implausible as some of those attributes emerge relatively early in life (e.g., need for achievement; McClelland & Boyatzis, 1982). We note that teaching the self-regulation strategy of implementation intentions repeatedly over an extended period (16 weeks) to people who have the goal to change their personality (e.g., become more extraverted) helped them to change their personality (Hudson & Fraley, 2015). Future research may test, whether teaching mental contrasting to people who want to change their person attributes can be effective in changing those attributes.

Relatedly, our cross-sectional correlational design does not rule out the possibility that a third variable may drive the observed relation between effective self-regulation and mental contrasting. For instance, inhibitory control is an executive function that enables people to hold back a dominant response. People with low inhibitory control have difficulties in self-regulation (Logan, Schachar, & Tannock, 1997). Low inhibitory control may also lead to a reduced use of mental contrasting because mental contrasting requires overriding people's dominant tendency to indulge or dwell (Sevincer et al., 2015). Similarly, people whose regulatory resources are depleted evince reduced self-regulation (Muraven & Baumeister, 2000) and a reduced use of mental contrasting (Sevincer et al., 2015). Thus, chronically low self-regulatory resources may impede both, successful self-regulation and the use of mental contrasting.

Need for Achievement, Academic Performance, and the Use of Mental Contrasting

In Study 1, we measured need for achievement as an indicator of successful self-regulation in the academic domain. We predicted and found that high need for achievement was related to the use of mental contrasting. High need for achievement was also related to high academic performance (measured by self-reported grades, Table 1) as was the use of mental contrasting. As already mentioned, the correlational design of our studies does not allow drawing causal inferences or testing mediation (Maxwell & Cole, 2007). Thus, future studies should use longitudinal designs to examine whether a high need for achievement fosters mental contrasting which in turn fosters academic performance. Also, because mental contrasting helps people to approach challenging tasks (Oettingen et al., 2010) and people high in need for achievement tend to take on medium challenging (but not too challenging) tasks (Atkinson, 1957), perhaps another reason why people high in need for achievement use mental contrasting is that it helps them to tackle such tasks.

The Five-Factor Personality Dimensions and the Use of Mental Contrasting

We stress that the observed relationships of the five-factor personality dimensions with mental contrasting were obtained in an exploratory context. Therefore, they should be considered as preliminary. First, high extraverted participants used mental contrasting. In Western cultures, high extraversion is associated with high job performance (Barrick, Mount, & Judge, 2001) and high work involvement (Roberts, Caspi, & Moffitt, 2003). Mental contrasting is an effective strategy in the academic and professional domains as it helps people to manage their time, make better decisions, and prioritize their projects (Oettingen et al., 2010). Therefore, we speculate that one reason why the highly extraverted participants tended to use mental contrasting is that it helped them to master their academic and professional projects.

Second, participants high in openness to experience tended to use mental contrasting (when controlling for expectations, incentive value, and the number of statements). Openness to experience involves an appreciation for variety of experience and entails intellectual curiosity (Costa & McCrea, 1989). We speculate that one reason why the participants high in openness to experience used mental contrasting might be that mental contrasting involves turning one's thoughts to multiple facets of a problem (aspects of both the desired future and present reality) rather than only one aspect as in indulging and dwelling. Another reason might be that openness to experience involves an appreciation for creativity and mental contrasting fosters generating creative solutions for insight problems (Oettingen et al., 2012). Thus, perhaps the participants high in openness to experience used mental contrasting because it helped them to come up with more creative ways to manage their personal projects.

Finally, high conscientious participants and low neurotic participants tended to use mental contrasting although the relations ceased to be significant when controlling for expectations, incentive value, and the number of statements. Conscientiousness involves self-discipline, perseverance, and diligence (Fleischhauer et al., 2009), and neuroticism indicates difficulties with regulating one's affective states (Matthews, Schwean, Campbell, Saklofske, & Mohamed, 2000). Thus, the preliminary pattern that high conscientiousness and low neuroticism indicated the use of mental contrasting is in line with our finding that well self-regulated participants used mental contrasting.

Interventions Teaching the Use of Mental Contrasting

Consistent with earlier research (Sevincer & Oettingen, 2013; Sevincer et al., 2015), only a minority of participants used mental contrasting (22% in Study 1 and 14% in Study 2). This observation highlights the need to develop interventions teaching people how to use mental contrasting. Our measure of mental contrasting may be helpful for screening people to identify those who least likely use it. Moreover, learning that the people who least likely use mental contrasting are also those who have the most difficulties in managing their life suggests that these people would also benefit the most from interventions that teach mental contrasting as a self-regulation tool.

Mental Contrasting in Other Samples and About Wishes From Other Domains

We investigated the use of mental contrasting in students who wrote about achievement-related wishes. Mental contrasting, however, is an effective strategy for other samples and wishes from other domains as well (Oettingen, 2012). Future research should investigate whether our findings generalize to other samples and wishes from other domains. For example, because self-regulation skills are essential for achieving and maintaining physical well-being (de Ridder & de Wit, 2006) and maintaining close relationships (Finkel & Campbell, 2001), one may test if high self-regulation skills are also associated with mental contrasting of wishes regarding health or close relationships. Research may also look at whether the use of mental contrasting (and the other modes of thought) is an individual difference in the sense that people use the same mode of thought across situations and over time. For instance, one may measure self-regulatory thought about wishes from the achievement, health, and relationship domains, wishes that vary in importance and urgency, and wishes over time.

Other Person Variables Related to Mental Contrasting

Future work may also investigate other person variables related to the use of mental contrasting. People high in self-handicapping, for instance, tend to employ excuses or self-create difficulties when facing challenging tasks. They do so to protect their self-esteem in the event of failure (McCrea & Hirt, 2001). Because people high in self-handicapping often set unattainable goals (Greenberg, 1985), they may refrain from mental contrasting, as mental contrasting leads people to select their goals by their expectations of success.

Moreover, people high in defensiveness tend to protect themselves from criticism and avoid admitting or facing their shortcomings or other threats to the ego (Paulhus, Fridhandler, & Hayes, 1997). Therefore, they may avoid reflecting on internal obstacles (e.g., feeling lazy) but come up readily with external obstacles (e.g., lack of opportunities). Future research may examine whether people high in defensiveness refrain from using mental contrasting with internal but not external obstacles.

Conclusion

Going back to the student at the beginning of this article, who uses mental contrasting to integrate his commitment to honorary school projects with class projects – the present findings suggest that people who are effectively managing their everyday life projects also use mental contrasting as a self-regulatory tool. Specifically, we measured skills, needs, and behaviors indicative of successful self-regulation in the academic domain and everyday life in general and

found that participants who were well self-regulated were the ones most likely to use mental contrasting.

Acknowledgments

Electronic Supplementary Material

The electronic supplementary material is available with the online version of the article at https://doi.org/10.1027/1864-9335/a000322

ESM 1. Questionnaire (pdf).
Study material of Study 1.
ESM 2. Questionnaire (pdf).
Study material of Study 1.

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