Getting a grip on ourselves

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GETTING A GRIP ON OURSELVES: CHALLENGING EXPECTANCIES ABOUT LOSS OF ENERGY AFTER SELF-CONTROL

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Research suggests that two, consecutive acts of self-control lead to impaired performance. This phenomenon is termed "ego depletion." It is assumed that an act of self-control consumes energy from some limited resource leaving less energy available for a subsequent act of self-control. Study 1 tested the alternative hypothesis that people's naïve theory or expectancy of the consequences of self-control influences their performance on control-demanding tasks. Participants watched an upsetting video fragment and subsequently performed a physical exercise test demanding self-control. Participants who suppressed their emotional reactions to the video showed ego-depletion: Their performance at the physical test decreased. However, if their (implicit) expectation that self-control negatively influences subsequent performance was challenged, their performance increased. Study 2 showed the existence of a dominant expectation that self-control consumes energy. These results indicate that the occurrence of the ego depletion phenomenon is strongly influenced by expectancies or schemata about self-control.

The ability to control thoughts, emotions, impulses, and behavior is considered a crucial human feature. The capacity to override

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and alter dominant responses is essential to pursue distant goals. Recent work of Baumeister and colleagues shows that people often fail at exercising self–control (e.g. Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven, Tice, &, Baumeister, 1998). Failure is especially likely when an individual attempts to exert control repeatedly within a relatively short period of time.

For example, Baumeister et al. (1998, Experiment 1) confronted participants with a bowl of radishes and a bowl of attractive chocolate cookies. Some participants were instructed to eat only from the radishes whereas other participants were invited to eat the cookies. This manipulation was found to undermine subsequent persistence with unsolvable puzzles. Participants who refrained from eating cookies (and thus controlled themselves) spent relatively less time at solving the puzzles than participants who were allowed to eat cookies. Likewise, Muraven et al. (1998, Experiment 1) demonstrated that participants who controlled their emotional reactions to a sad movie, showed reduced performance on a subsequent physical control task.

Baumeister and colleagues describe the performance undermining effects of self–control in terms of two metaphors. The first metaphor is the Freudian idea of ego energy or strength (Baumeister et al., 1998; Baumeister, Muraven & Tice, 2000). By this view, the self is a resource of limited capacity and, therefore, controlling the self consumes energy. After an act of self–control (such as resisting desirable food or controlling emotions), resources become exhausted and an individual finds him– or herself in a state of *ego depletion*. The energy resource is thought to be involved in a broad variety of the self's operations and, according to Baumeister and associates (see for reviews Baumeister et al., 2000; Muraven & Baumeister, 2000), the limited nature of its capacity has been demonstrated in diverse domains such as thought–control, affect regulation, impulse control, and deliberate decision–making. Because each act of self–control depends on the same energy source, exercising control in one domain would undermine control performance in another. This is why, for example, affect regulation would impair subsequent physical self–control and vice versa. The second metaphor is that of self–control as a "muscle" (Muraven & Baumeister, 2000). This metaphor suggests that people need to recover after an exercise of self–control, that self–control can be trained and that people,

like athletes, more or less decide whether they "give it all" or wish to conserve their energy. The latter implies that suboptimal performance may be either a reflection of ego depletion (i.e., exhaustion) or of a deliberate decision to spare one's resources (i.e., conservation). The self–control model of Baumeister and colleagues depicts willpower as an organ, such as a leg or an arm operated by some independent intelligence, that is, the self (see also Ainslie, 2001). Although the use of metaphors such as "strength" and "muscle" are intuitively appealing, the precise nature of limited strength or energy remains unclear. The concept of strength is, as Metcalfe and Mischel put it: "much in need of a theory that specifies how it comes about and operates and when it goes up and down, and who has it and who lacks it." (1999, p.16).

Other researchers have stressed the strategic nature of self–control. For example, Richards and Gross (2000) argued that cognitive costs of emotion regulation vary according to how emotions are regulated. They showed that construing a potentially emotional situation in a way that decreases its emotional relevance (antecedent–focused regulation) consumes considerably less resources than strategies that aim at regulating one's emotional reactions during the occurrence of an emotional event (response–focused regulation). Likewise, early research on self–control in children using the delay–of–gratification paradigm (the dilemma of choosing between an immediate, small award or a greater, delayed award; Mischel, 1974; Mischel & Ebbesen, 1970), pointed at the importance of control strategies. Children were better able to wait if they shifted their attention to objects in the room, or dissociated themselves by focusing on the abstract properties of desired stimuli ("thinking about sweets as little clouds, or imagining that they were just a picture and not real"). Webb and Sheeran (in press) showed that forming implementation intentions (see Gollwitzer & Brandstätter, 1997) helped people to overcome ego depletion and enhanced their ability to self–regulate their behavior successfully.

These studies on emotion regulation, delay of gratification, and implementation intentions demonstrate that people do not only make decisions about whether to conserve or consume energy, but are also somehow capable of managing the amount of effort involved in a control operation. Certain techniques, such as a re-

appraisal of a potentially emotional situation, focusing your attention on something else or dissociating yourself from a wanted object interact with the costs of exercising self–control. The default–option is that self–control consumes energy, yet mental strategies may help to reduce the amount of energy needed. With this in mind, the question arises to what extent people apply some scheme or naïve theory when faced with a task requiring self–control. The belief that self–control "eats up" your energy may be learned by experience or by internalizing folk wisdom reflected in proverbs such as "a bow long bent at last waxes weak," or "you can't burn the candle at both ends." Thus, it may well be the case that expectations about self–control and its consequences determine how people perform on demanding tasks. To the degree that such expectations play a pivotal role in performance undermining effects of self–control, Baumeister et al.'s metaphors are just what they are: metaphors that describe people's naïve theories about self–control rather than necessary and invariant processes underlying self–control per se.

In the first study, we tested whether expectancies about self–control influence performance on tasks that require such control. More specifically, we explored the possibility that self–control performances appeal to a widespread, but not necessarily correct, schema that self–control is highly energy consuming. Thus, our study addressed the issue of whether people perform less on subsequent control tasks as a result of such schema, or because of a genuine lack of energy. In another context, the relevance of such schema–like expectations or naive lay theories was demonstrated by Tice, Bratslavsky, and Baumeister (2001). Their study on impulse control showed that participants in a bad mood indulged themselves in fattening snacks if they believed that eating repairs your mood. However, when this implicit expectancy was challenged, and people were informed that eating does nothing for your mood, they did not consume more than control participants.

STUDY 1

Our first study relied on the experimental procedure reported by Muraven, Tice, and Baumeister (1998, Experiment 1). Specifically,

our experiment examined the effects of emotion regulation on a subsequent muscular endurance test. As demonstrated by Wegner, Erber, and Zanakos (1993) and Muraven et al. (1998), emotion regulation requires effort. Therefore, we asked some of our participants to suppress their emotions while watching an upsetting video excerpt, whereas other participants received no such instructions. The muscular endurance test consisted of a task in which participants were offered a handgrip that they had to squeeze as long as they could. Muraven et al. claim that: "maintaining a grip is almost entirely a measure of self–control and has very little to do with overall bodily strength" (1998, p. 777). Expectancies about control were challenged by informing some participants in the suppression condition that controlling your emotions does not undermine subsequent exercise of physical control, while other participants in the suppression condition received no such instructions.

We anticipated that participants who suppressed their emotions, but whose control expectancies were not challenged would perform worse on the muscular endurance task, thereby replicating the classic ego depletion phenomenon. On the other hand, we expected participants whose control expectancies were contradicted to perform normally on the endurance task.

METHOD

Participants and Design. The 53 first–year students (46 women and 7 men) of the University of Maastricht were randomly assigned to one of 3 conditions (No Suppression, Suppression, Suppression + Expectancy challenge).

Procedure. All participants were individually tested in 30–minute sessions. The experiment was presented as a study on mental and physical skills. The experimenter explained the general procedure of the experiment, after which participants signed a consent form. Next, the experimenter asked participants to place a handgrip in their dominant hand and inserted a match between the two handles as soon as the participant squeezed them together. The moment the participant relaxed his or her grip, the match fell out. The experimenter started a stopwatch at the moment she placed a match between handles and stopped timing when the match fell out. After the first hand grip task, the experi-

menter asked participants to watch a 3–minute video–excerpt that showed an Asian woman who causes herself to throw up and who subsequently eats up her own vomit. The excerpt was used in prior research and elicits strong feelings of disgust (De Jong, Peters, & Vanderhallen, 2002). Disgust was preferred over emotions such as joy or sadness because disgust is relatively easy to elicit in a laboratory situation in an ethically acceptable manner (Gross & Levenson, 1993). Moreover, most people agree about what is disgusting, whereas they often disagree about what is humorous or sad.

In the No Suppression condition participants received the following instructions:

> In a moment you will see a video. Before the video starts, the screen will turn blank for a while. It is important that you watch the video with attention. As I explained earlier, the video may evoke an emotional reaction so please be aware that you can signal me to stop the video at any time you wish.

In the Suppression condition and the Suppression + Expectancy challenge condition, participants received the same instructions with the following addition:

> If you experience any emotions during watching the video, try not to show them. In other words, try to behave in such a way that other people cannot see what you are feeling.

Thus, all participants saw the same movie and probably had the same unpleasant response to it. The only difference was that No Suppression participants could express their emotions if they felt like it, whereas the participants in the two suppression conditions were instructed to control their emotional responses.

Having informed participants about the video, the experimenter left the room and went to a nearby control room. She observed the participant through an unobtrusive window in order to react quickly if the participant indicated that the video should be stopped. The participant was seated on a small desk with a questionnaire placed upside down. The following text was presented on the video–screen:

> In twenty seconds the video will start. Use this time to free your mind of all thoughts, feelings, and emotions.

After the video–excerpt, the following text was displayed:

> You are now allowed to fill out the questionnaire that is placed on your desk. Please wait for the experimenter when you are finished.

After filling out the questionnaire, the experimenter returned and the participants in the No Suppression and the Suppression condition squeezed the handgrip for the second time, using the same procedure as for the first handgrip measurement.

Before the second handgrip measurement the experimenter read the following text to the participants in the Suppression + Expectancy challenge condition:

> Often people believe that they have to rest after an effortful task. However, scientific investigations prove that this is not the case after emotional effort. It seems that people do not have to rest after an emotional exertion task. In contrast to their expectations, people may actually perform better on physical exertion tasks after an emotional effort.

Next, the second handgrip measurement was taken in the Suppression + Expectancy condition. Finally, participants filled out a second questionnaire. Participants were debriefed and thanked for their participation.

DEPENDENT MEASURES

All questionnaire items were answered on 4–point scales ranging from *totally disagree* (1) to *totally agree* (4). Subjective fatigue was measured twice: directly after watching the video, and directly after the second handgrip measurement. Participants indicated their agreement on 8 statements (*I feel tired / energetic / fit / drowsy / not clear / exhausted / I don't feel like doing anything / I have the feeling I can handle the world*).

Four items were included to measure aversive reactions to the video excerpt (*I almost had to throw up myself / I felt sick / at this moment, the sight of food would make me sick / the video was too disgust-*

ing to watch). A shortened version of a self–report mood inventory of Gross and Levenson (1993) measured participants' emotional reactions to the video excerpt. Participants rated eight statements (*I feel amused / disgusted / sad / anxious / neutral / surprised / aroused / aversion*). Directly after watching the video, we asked participants in the two suppression conditions (Suppression, Suppression + Expectancy challenge) whether they complied with the instructions. Endorsement of 3 statements was measured (while watching the video, *I succeeded in not showing my emotions / I continuously tried to hide my emotions / I had trouble not to show my emotions*). Besides checking whether suppression instructions were followed, we wanted to check whether No Suppression participants spontaneously controlled their emotions because of the upsetting nature of the video excerpt. Therefore, in all three conditions participants responded to two statements on emotional control (*I tried to control my emotions / I controlled myself*). In order to check possible differences between participants in avoiding the aversive stimuli, we asked how they watched the video *(during the video presentation, I looked away)*.

In order to control for individual differences, physical performance was measured twice: at the beginning of the experiment and after the video presentation. Using a stopwatch, the time (in milliseconds) was measured that a participant squeezed the handles of the handgrip together. At the end of the experiment, we asked all participants to estimate the time they managed to squeeze the handgrip at the first handgrip task, and at the second handgrip task. Subsequently, we asked them to explain a possible difference in performance in their own words.

RESULTS

The data of two participants were omitted from further analysis because they gave a stop sign during the first minute of the video presentation (one participant in the Suppression and one participant in the No Suppression condition). Hence, analyses described below included the data of the remaining 51 participants (No Suppression $n = 16$, Suppression $n = 17$, Suppression + Expectancy challenge $n = 18$).

Check on the Suppression Instructions. Participants in the two suppression conditions generally followed our instructions to suppress their emotions as shown by their agreement on 3 statements asking whether they succeeded in suppressing their emotions, and whether they tried to hide their emotions ($M = 2.94$; $SD = .62$, $M = 3.24$, $SD = .45$, respectively). Suppression participants also agreed that they had difficulties not to show their emotions ($M = 2.98$, $SD = .79$) indicating that the suppression task required quite some effort. Although the expectancy manipulation was given subsequent to the suppression task, we checked for (coincidental) differences between the Suppression and the Suppression + Expectancy challenge condition in following the instructions. A multivariate ANOVA showed no differences in compliance to our instructions between the two conditions (F (3, 30) < 1, *ns*). There was also no difference in the extent to which participants reported to look away from the screen during the presentation of the video (F (2,48) < 1, *ns*).

Using planned comparisons, we checked whether Suppression participants controlled their emotions more than No Suppression participants. Suppression participants showed significantly more agreement with the two control statements than No Suppression participants who could express themselves (all p's < .05).

Aversive Reactions to the Video. A multivariate ANOVA showed no difference in aversive reactions among the three conditions (F (4, 46) < 1, *ns*).

Mood. There was no difference in mood among the three conditions (F multivariate (7, 43) < 1, *ns*).

Subjective Fatigue. The 8 items that intended to measure subjective fatigue were highly correlated (Cronbach's $\alpha = .89$) and the mean score for each participant was computed in order to compose a fatigue scale. Directly after watching the video (first fatigue measurement), there was no difference in fatigue between the three conditions (F (2, 48) = 1.10, *ns*). An ANOVA using the first fatigue measurement as a covariate and condition (No Suppression, Suppression, Suppression + Expectancy) as a between–subjects factor, resulted in a significant difference, F (2, 47) = 5.04; $p < .05$. Contrast analyses showed that No Suppression and Suppression participants reported more fatigue at the second measurement than the Suppression + Expectancy challenge participants ($p <$ .05).

TABLE 1. Observed and Perceived Performances (in milliseconds) at the Two Handgrip Tests

	Handgrip Test 1 (observed)		Handgrip Test 2 (observed)		Observed Difference		Perceived Difference	
Condition	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
No Suppression	27.46	17.50	28.70	16.23	+1.24	9.40	−14.06	17.50
Suppression	32.81	24.76	26.65	18.53	−6.17	11.14	−13.01	20.31
Suppression + Expectancy	25.95	20.56	34.20	24.27	+8.77	8.77	−2.44	12.95

Physical Exertion Task. An ANOVA using the difference between the first and the second handgrip test as within factor and condition (No Suppression, Suppression , Suppression + Expectancy) as between factor showed a significant interaction, F (2, 48) = 9.44, p = .001. Inspection of this interaction indicated that the performance of no suppression participants at the two handgrip tests remained the same, t (16) = .53, *ns*. Participants who suppressed their emotions gave up significantly sooner at the second handgrip test compared to the first test and, thus, showed signs of ego depletion (t (17) = 2.28, p = .02). Participants who suppressed their emotions *and* received an expectancy challenge performed better at the second handgrip test than at the first test, t (18) = 3.99, p < .001). In Table 1 the performance at the first and the second handgrip test are summarized per condition. An alternative ANCOVA on the scores of the second handgrip test, using pretest scores as covariate also resulted in a significant effect of condition (F (2, 47) = 8.63, p < .001). We also checked the correlation between performance on the first and the second handgrip test and found a highly positive correlation (r = .84, p < .001). The correlation between the first and second test within each condition varied between .82 and .94. This rules out the possibility that low performance on the second test was caused by (extreme) effort exertion on the first test or vice versa.

Although the difference in squeezing time between conditions at the first handgrip measurement was non–significant (F (2, 48) = .53, *ns*), we checked the distribution of standardized squeezing times for possible outliers. One male participant in the Suppres-

TABLE 2. Reasons For Perceived Differences at the Two Physical Exertion Tasks

	Physical Fatigue		Mental Fatigue		Inner Strength		Other Reason		Total	
Condition	Abs	%	Abs	%	Abs	%	Abs	%	Abs	%
No Suppression	8	47.1	7	41.2	0	0	3	17.6	18	100
Suppression	3	18.8	10	62.5	1	6.2	2	13.4	16	100
Suppression + Expectancy	5	27.8	4	22.2	5	27.8	3	16.6	17	100

Note. Abs = Absolute. χ^2 (6, N = 51) = 39.12, $p < .001$.

sion condition clearly outperformed all other participants ($z > 3$). Analysis omitting the data of the outlier replicated the results of the repeated measurements ANOVA using the total sample, (F (2, 47) = 8.30, $p < .001$).

Perceived Performance. Participants' estimations of how long they squeezed the handgrip at the two tests showed that they perceived their second achievement as the worst. Seventy-six percent thought that squeezing time was shorter at the second test, while in fact 51% performed worse at the second test. In the No Suppression condition, 81% perceived the second squeezing time as shorter (observed: 62%), whereas in the Suppression condition and in the Suppression + Expectancy challenge condition 83% (observed 83%) and 59% (observed 18%) respectively did so. Thus, No Suppression participants and Suppression participants were relatively more accurate in judging their second performance than the participants in the Suppression + Expectancy condition of which more than half wrongly thought their performance declined. This pattern was reflected in correlations between perceived and observed performance at the second test. The correlation was stronger in the No Suppression and Suppression condition (r's .76 and .75 respectively) than in the Suppression + Expectancy condition (r = .51). This suggests that participants in the latter condition had more difficulties in making an accurate estimation of their performance.

Subjective estimations of performance at the first and second handgrip measurement were also entered in an ANCOVA with condition as a between subjects factor, the estimations at the first measurement as a covariate, and the estimations at the second

performance as an outcome variable. This resulted in a marginally significant difference (F (2, 47) = 2.86, p = .07). Difference scores of the estimated performances are shown in the last column of Table 1 and indicate that both Suppression and No Suppression participants thought that they performed considerably worse at the second test. Thus, their estimations were too pessimistic: they did "bad" but not that bad. Participants in the Suppression + Expectancy challenge condition thought they performed slightly worse whereas they actually did better.

Participants' own explanations for a possible difference in performance were coded into four categories by two independent judges who were blind as to the experimental conditions. The four categories were:

Physical fatigue. (e.g., *my hand still hurts from the first time, I was physically tired, the first time, my hand was less tired*).

Mental / psychological fatigue. (e.g., *I felt drowsy, the video was exhausting, I felt distracted because of the video images*).

Inner strength. (e.g., *I did better because I felt psychologically strong, the emotional video did not affect my performance, I felt like I could control myself and my will*).

Other reasons. These were mostly "technical" reasons (e.g., *I placed my hands too high on the grip*), or reasons unrelated to the experimental tasks (e.g., *I was really nervous: first time I participated in an experiment*).

The two judges agreed about the categorization of all but one reason (98% agreement). After discussion, they agreed to assign the reason to the category "other reason". Table 2 lists the distribution of reasons over the four categories for each condition.

Participants in the Suppression condition mentioned mental fatigue as the main inhibitory factor for their impaired performance. The No Suppression condition identified mental fatigue and physical fatigue about equally frequently as reasons. In the Suppression + Expectancy challenge condition, in which about two–thirds of the participants mistakenly thought that their performances dropped, failure was attributed to mental and physical fatigue. However, participants in this condition who perceived their second performance as unchanged, mentioned factors related to inner strength as an explanation. Thus, the most marked

results were that participants in the Suppression + Expectancy perceived their second performance at the handgrip test relatively more often as unaltered or improved and that they reported feelings of inner strength to explain their performance. In the No Suppression and Suppression condition participants believed that they performed worse at the second test. No Suppression participants attributed a drop in their performance about equally to physical and mental fatigue, whereas Suppression participants reported mental fatigue as the most important cause.

DISCUSSION

The aim of our study was to examine whether modifying people's (implicit) expectations or scheme about consequences of self-control affects their performance on control-related tasks. The pattern of results was largely consistent with our hypothesis. When people exercise self-control by trying to suppress an aversive, emotional reaction, their performance on a subsequent physical exercise task drops. This result replicates the traditional ego-depletion phenomenon. However, the ego-depletion phenomenon was eliminated, and even reversed when people were told that controlling your emotions does not affect your physical performance in a negative way. Thus, the challenge of expectancies about the limitations of self-control, eliminated the tendency of declining performances on a subsequent control-demanding task.

The data of participants' perception and interpretation of their own performance supports our assumption that expectancies or schemata are critically involved in the appearance or disappearance of ego depletion phenomena. Apparently, people believe and act upon the naïve theory that successive acts of self-control are exhausting, either mentally or physically. This schema was not only held by participants who were instructed to suppress their emotional reaction, but also by participants who did not have to control their emotions. These No Suppression participants believed that their performance on the second physical exertion test was considerably worse, when, in fact, it did not differ significantly from their performance on the first test. There are a few possible reasons as to why these participants erroneously be-

lieved that their performance declined. A first possibility is that these participants perceived the video fragment as a challenge to their self–control, even though they were not instructed to control their emotional reactions. As stated earlier, the video fragment was quite upsetting; even without instructions to control emotional reactions, participants may have felt an urge to suppress emotional reactivity. Another possibility is that participants in the No Suppression condition interpreted the first handgrip task as a manipulation intended to undermine performance. The two possibilities are reflected in the explanations reported by these participants: both mental fatigue due to the upsetting nature of the video and physical fatigue caused by the exertion at the first physical test were mentioned as reasons for reduced performance. The belief that one is tired and therefore performs less well is also reflected in the subjective experience of fatigue: Participants who were not instructed to suppress their emotions reported the same increase in fatigue as participants who did receive suppression instructions, but were not challenged in their expectancies.

Our results clearly show that a simple challenge of the expectation that self–control wears oneself out has a direct positive effect on performance. Thus, the ego–depletion phenomenon can be reversed by a simple manipulation of such expectations. An alternative explanation follows from Baumeister's conservation hypothesis (Baumeister, Bratslavsky, & Tice, 2000), which states that overruling ego–depletion leads to even more exhaustion. Certain motivators, such as an expectancy challenge, may urge people to draw on their last energy, leaving them afterwards even more depleted than those who were not motivated to do so. If this is true, we would have expected that the participants who received an expectancy challenge would feel more tired than the participants who received no such challenge. This was not the case: Challenged participants did *not* report increased fatigue after the second physical exertion task. However, whether an expectancy challenge of self–control expectations leads to the delay of ego depletion effects or to the intended change in expectancies should be a subject of follow–up research. Ideally, such a study should include a series of self–control tasks. If the conservation hypothesis holds, one would predict that expectancy challenge participants will increase their performance at the second task because a challenge motivated

them to spend their last energy, but decreased performance at a third self–control task because of energy depletion.

While our attempt to change negative expectations about self–control led to increased performance, it did not fully eliminate the expectation that self–control may have negative consequences. Even though they actually improved themselves, the majority of the participants in the Suppression + Expectancy challenge condition still believed that their performance dropped and blamed this drop on mental or physical fatigue. In other words, schemata about self–control can be quite persistent: behavior ameliorates, but cognition hesitates. For most people, the mere challenge of expectations about the operation of self–control seems not enough to modify a scheme about self–control. Such a modification probably requires feedback about how well they did.

STUDY 2

The first study was based on an the assumption that people apply some naïve theory when confronted with a task that demands their self–control. We assumed that people expect that self–control is tiring and that a subsequent self–control demanding task will fail because of a lack of energy. Our first study showed that a simple challenge of such expectation instigated people to perform better on a subsequent control–task and no signs of ego–depletion were found. A possible limitation of Study 1 is that we did not explicitly test participants' ideas and expectations of self–control. Some evidence for the general expectation that self–control costs energy may be derived from Muraven et al. (1998, Study 4) who asked their participants to write two autobiographical stories: one about a situation in which they successfully controlled their emotions and one about a situation in which they failed to control their emotions. Stories that described loss of control contained relatively more references to being tired, stressed, or drunk than stories that described a successful event of emotion coping. The finding that such references are spontaneously mentioned in stories about self–regulatory failures suggests that a "conscious sensation of fatigue is associated with poorer self–regulation." (Muraven, Tice, & Baumeister, 1998, p. 786).

TABLE 3. Item Means and Standard Deviations at the "Self–control as Energy" subscale and the "Self–control as State of Mind" subscale (n = 47)

"Self–control as Energy" items	Mean	*SD*	"Self–control as State of Mind" items	Mean	*SD*
1. After putting my best foot forward, I need to replenish my reserves	2.63	.74	1. I perform better when I am under pressure	2.49	.65
2. After trying to control my emotions, I feel tired	2.65	.51	2. I always manage to find the energy for the things I want to do	2.28	.57
3. After finishing something I don't like to do, I feel like letting it all hang out	3.22	.49	3. Sometimes, when I feel like I am finished, I can do a lot more than I thought	2.51	.51
4. I get tired when I have to control myself	2.72	.57	4. If things don't go my way, I add a little extra	3.03	.79
5. I have difficulties to control myself when I am tired	3.17	.79	5. If I am really motivated, I always manage to control myself	2.59	.45
6. If I try hard my battery runs down: I need a break before I can go on	2.80	.45	6. If you really want to, there are no limits to the extent to which you can control yourself	2.66	.54
7. If I control myself, this costs me a lot of energy	2.68	.61	7. If I manage to control myself, I feel more energetic	2.37	.55
8. After completing an exacting task, I take some time to relax	3.29	.57	8. If I feel tired, I try to compensate by trying extra hard	2.71	.66
9. Controlling intense emotions wears me out	2.91	.55	9. Successful control is a matter of the right mentality	2.77	.49
10. If I plan to do something that involves self–control, I try to be well–rested	3.05	.66	10. If I control myself, I feel strong	2.65	.48
Total Subscale	2.92	.37	**Total Subscale**	2.61	.41

In a second study we examined whether people indeed endorse the viewpoint that self–control costs energy. Agreement with the "self–control as energy" viewpoint was compared to the alternative view that self–control is more a matter of the right state of mind or mentality. According to "self–control as state of mind" view, self–control is primarily a matter of motivation; thus, if you want to and try hard, you can always control yourself. In such a view, self–control is not a matter of energy (alone) but an activity that can be positively influenced by a positive attitude or state of mind toward control–demanding activities and the activity of exercising control. We hypothesized that participants agree with both views on self–control. However, we also expected that the "self–control as energy" view dominates the "self–control as state of mind" view.

METHOD

Participants and Procedure. Psychology students (47) at the University of Maastricht took part in a computerized survey study. They filled out a questionnaire about self–control that was one of a series of unrelated questionnaires about diverse attitude issues.

Materials. The questionnaire consisted of 10 items that were intended to tap the "self–control as energy" view and another 10 items that measured participants' agreement with the "self–control as state of mind" view. All items were phrased as statements and presented in a random order. Endorsement could be expressed on 4–point scales varying from *totally disagree* to *totally agree.*

RESULTS AND DISCUSSION

Cronbach's α of the 10 items related to "self–control as energy" and the 10 items related to "self–control as state of mind" were .84 and .78 respectively. The mean ratings of the "self–control costs energy" scale (M = 2.93, SD = .37) and "self–control as state of mind" scale (M = 2.61, SD = .44) differed significantly (two–tailed t (46) = 2.72, $p < .01$). Participants agreed relatively more with statements that proposed the "self–control as energy" view than with statements that proposed the alternative view of "self–con-

trol as state of mind" (see Table 3). The answers to the two scales were not correlated, r (35) = .22, p = .20.

These results imply that (at least) two theories exist about the working and operation of self–control. The most prominent or default theory is that self–control is primarily a matter of energy—to succeed at a self–control requiring activity, you need to be well rested, free of other self–control demands and you feel pretty tired afterwards. However, people also endorse the view of self–control as a state of mind—with the "right" attitude you *can* control yourself, even when you think that you are tired or busy with something else. We would argue that our first study showed that if people are confronted with a series of subsequent control–activities, which was the case in Study 1 and in most studies on ego–depletion, the self–control as energy theory is triggered. However, if this view is challenged, people switch to another self–control theory that assumes no limit to their self–controlling capacities. We do not assume that people actively choose between different views or theories but that the subtle domination of one theory over another is relatively unconscious.

GENERAL DISCUSSION

Our data do not cast doubts on the phenomenon that a continuing application of self–control results in decreasing performance. However, our results suggest that self–control is not a matter of energy alone. Our studies indicate that self–control performance is highly susceptible to how people think self–control operates. The behavioral consequences of a negative control–expectancy should probably not be underestimated. Indeed, the experimental literature offers many examples of expectations favoring or undermining performance (e.g, Rosenthal, 1994; Kvavilashvili & Ellis, 1999). Our first study showed that an energy–related expectancy of self–control affects performance in a negative manner, and it is imaginable that people even restrain certain control–requiring activities because they think such activities will be too exhausting. Another possibility is that self–control performance is the result of an interplay between energy and perception. The "right" perception mediates the economic management of a scarce resource, like a successful, professional sportsman or woman who needs the right

"mentality" or state of mind to make the most of his or her physical potential.

A clear understanding of what people think and do when they control themselves is not only theoretically, but also practically, relevant. For example, most health interventions are aimed at behavior that requires some form of self–control, that is, refraining from bad habits such as smoking or sticking to healthy habits such as regular exercise. If self–control is a matter of energy, such interventions should help people to increase their energy reserves, for example by training. If self–control is mediated by expectancies, it is worthwhile to examine whether such interventions may benefit from systematically modifying inappropriate control–expectancies for more fruitful ones.

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