# Emotions, cookies and long-term goals, what is the relation?

A study on the correlation between self-control and reappraisal

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**Abstract**

The purpose of this study is to investigate a relation between self-control and reappraisal. Self-control is seen as the willpower to achieve long-term goals and reappraisal is an emotion regulation strategy. In general, self-control is future-oriented and emotion regulation strategies are short-term-oriented. What will happen when reappraisal is manipulated to also be future-oriented? This leads us to the research question: how are self-control and reappraisal related? It is hypothesized that they correlate positively, only when reappraisal is manipulated with long-term goals.

Data for this study was collected by an online experiment, which consisted of three conditions: a control condition where participants acted as they normally would do, an experimental condition with reappraisal instructions in combination with short-term goals and another experimental condition with reappraisal instructions in combination with long-term goals. These instructions were given before a sad clip was showed. Differences between these conditions in relation with self-control were analyzed.

The results reveal that there is no relation between self-control and reappraisal, even if there is involvement of long-term goals. Although, it is more likely that deficits in the study itself caused these results; due to a low power the results can be misrepresented and it is assumed that participants did not follow carefully their instructions. From the literature it appeared that there should be a relation, however it is unclear if this is positive or negative. Therefore, this study concludes that long-term goals could still be the missing link and several leads for future research are also given.

*Keywords:* Self-control; long-term goals; emotion regulation; reappraisal

Imagine you are grocery shopping and you are standing in front of the cookie aisle, your consciousness says not to buy cookies, since they are bad for your health. However, there is that other voice telling you that you really want to eat cookies. Imagine you are feeling down, will this influence how hard it is to resist the cookies?

To make a sensible decision, you need willpower to say no to those cookies and think of the long-term benefits of eating healthy (Evers, 2018; Reeve, 2014). However, sometimes it is hard to resist short-term temptations. For example, it is a widespread and traditional assumption that the way you deal with your emotions, is there to maximize pleasure and minimize pain (Koole, 2009). Willpower and the way you are dealing with emotions can conflict during dilemmas such as buying the cookies or not. For example, willpower wants you to achieve the goal to stay healthy, however, you also want to experience as much as pleasure as possible by eating cookies. Other examples of dilemmas are: smoke a cigarette or stay healthy, buy new shoes or save money. The conflict between willpower and dealing with your emotions, results from a difference in time perspective. Willpower is oriented towards long-term goals and dealing with emotions is oriented towards short-term benefits (Evers, 2018).

When you have a dilemma, your willpower and the way you deal with your emotions can conflict. Are they therefore related to each other? People are confronted daily with these dilemmas. That is why it is interesting to gain more knowledge about how willpower and dealing with emotions are related. In general, generating more knowledge can be used to make people better choice makers or support them in choosing wisely. However, there is little research surrounding this topic and it draws fairly ambiguous conclusions. From pilot data it appeared that they are not related (source), however, Evers (2018) suggested that they do relate but it is unclear whether they are positively or negatively related. The reason for this ambiguity could be the difference in time perspective according to Koole, Van Dillen and Sheppes (2011). Maybe long-term goals are the missing link. If both could be oriented towards long-term goals, will they positively relate?

## Self-control

The willpower to choose wisely is known as self-control. Self-control is seen as the capacity to regulate (i.e., change or inhibit) a dominant (behavioral, emotional, or cognitive) response (de Ridder, Lensvelt-Mulders, Finkenauer, Stok & Baumeister, 2012). In general, more self-control leads to happier and healthier lives in comparison to people with lower self-control. Specifically, people with more self-control achieve better grades at school, can adapt

better psychologically, have more confidence, and have better interpersonal relations, which leads to a better mental health and a more successful life (Reeve, 2014; Tangney, Baumeister & Boone, 2004). Research has found that people with high self-control are better in dealing with their emotions (maven, Tice, & Baumeister, 1998). Overall, self-control is used to achieve long-term goals and to interrupt automatic tendencies and short-term temptations. This can lead to a conflict between two competing goals or a conflict between the current state and the desired state; it is hard to resist a cookie, although you know it is unhealthy (Evers, 2018; de Ridder et al, 2012).

**State & trait**

Self-control can be divided into two parts: trait self-control and state self-control. Trait self-control is seen as a stable ability (or characteristic) that prioritizes the desired (long-term) goal during a self-control dilemma. It is focused on self-regulatory success. State self-control is seen as a temporal level of self-control that differs in each situation. In this view, self-control is seen as an effortful inhibition process which causes situations with self-control failure. That is why research on state self-control often emphasizes the effects of ego depletion (de Ridder, Kroese & Gillebaart, 2017).

**Ego depletion**

According to the limited resource model or strength model of self-control, self-control is a limited source; all activities requiring self-control are dependent on the same amount, therefore one act of self-control reduces the amount of self-control for other activities (Muraven & Baumeister, 2000). According to these models, you can ‘run out’ of self-control. This can lead to ego depletion; we cannot override or control our impulses anymore, because we depleted our source of self-control. Although, this is still under debate; self-control failure could also result from a shift in motivation or attention when exerting self-control (de Ridder, Kroese & Gillebaart, 2017). However, the latter view is quite recent and there should be more research looking into both views on self-control failure. For now, ego depletion will be used. Moreover, ego depletion may be related to how you deal with your emotions; it could be more source depleting when regulating an emotion of high intensity compared to an emotion of lower intensity. The intensity of emotions depends on the timing; the earlier you deal with your emotions, the less self-control it takes (Evers, 2018).

## Emotion regulation

A term for dealing with your emotions is emotion regulation. In general, there are several conscious and nonconscious strategies to regulate an emotional response, for example increase, maintain or decrease that response (Evers, 2018; Reeve, 2014). Gross (1998a) suggested a process model of emotion regulation with five strategies, which is widely used and nowadays the most influential: situation selection, situation modification, attentional deployment, reappraisal, and response modulation. It is not always easy to use one of these strategies. Emotion regulation is a skill and the better the quality of this skill, the better the emotion regulation, with better outcomes for the quality of someone's relationships and academic achievements (Reeve, 2014).

### Process model of Gross

All the five strategies will be shortly illustrated by an example of Jack. Jack broke up with his girlfriend and he is very sad about it. He strategically prevents the sadness by avoiding the restaurant he and his ex-girlfriend always went to (*situation selection*). However, Jack wants to go to this restaurant. To change the sad situation a little bit, he brings his new date to this restaurant (*situation modification*). During this date, Jack directs his attention away from the situation causing his sadness. He focuses on how beautiful his date is (*attentional deployment*). However, Jack still feels the pain of his breakup. To deal with this pain, he changes his thoughts about the situation. He experiences his breakup not any longer as very sad, but as a necessary step to meet a new and better lover. He is actually quite happy about the breakup, because it resulted in meeting his date. Jack reappraised his sadness into happiness (*reappraisal*). When above strategies are not possible, Jack can always suppress his sadness (*response modulation*). However, there is a possibility that this strategy backfires and/or produces negative side effects (Evers, 2018; Gross, 1998a; Gross, 199b, Reeve, 2014).

All these strategies are different processes, where the timing and intensity of emotions influence which strategy is used. They can be divided in antecedent-focused regulation and response-focused regulation. Antecedent-focused is emotion regulation that takes place before a response turns into an emotion. This corresponds with situation selection, situation modification, attentional deployment and reappraisal. Response modulation corresponds with response-focused regulation, because the emotion regulation starts after the emotion is present. Antecedent-focused regulation strategies have better benefits and are more effective than response-focused strategies (Evers, 2018; Gross, 1998a; Gross, 1998b).

**Reappraisal**

For the current study, reappraisal is chosen. In this strategy, the situation is interpreted differently in order to change the emotional impact (like Jack did with his breakup). It is proven that using reappraisal decreases your negative emotion experience and even decreases psychological responding (Gross, 1998a). For example, after watching a sad movie, you feel less sad if you kept in mind it was staged (using reappraisal).

Reappraisal is a strategy with positive outcomes. These outcomes have been scientifically proven compared to outcomes from response modulation strategies (Gross, 1998b). Reappraisal is seen as a highly effective strategy and individuals who mostly use this strategy tend to have a better psychological, social, and physical well-being (Gross, 1998a; Reeve, 2014). Reappraisal can be used relatively early in the trajectory of emotion regulation (antecedent-focused). Probably, this is why it appeared that reappraisal costs less cognitive effort compared to suppression, which is response-focused (Evers, 2018; Sheppes & Gross, 2011). Furthermore, reappraisal is chosen over other antecedent-focused strategies, because it is used after people are unable to avoid or change the situation; they must cope with this situation anyway. Therefore, it is practical to use reappraisal during the experiment of this study (Evers, 2018).

Thus, reappraisal can be more effective in reducing the emotional impact and can have benefits in the long-term (Sheppes & Gross, 2011). Written like this, it looks like reappraisal and self-control are on the same page during a self-control dilemma; both can prevent choosing the cookie, whether by reappraising your sad feelings so it becomes easier to listen to the wise voice in your head or by having the ability to override a temptation and attain a long-term goal. However, there is little experimental proof for this suggestion. Moreover, sometimes even no relations are found.

**Self-control, emotion regulation and reappraisal**

It is a central idea that people want to feel better when they are feeling sad. Mostly, the ways to make oneself feel better, involve indulging and giving into things that self-control normally would resist. Indulging can also be seen as a strategy to regulate your negative emotions. In this case people regulate their negative emotions by indulging and this is at the cost of exerting self-control, leading to self-control failure (Tice & Bratslavsky, 2000).

On the other hand, it appears in a study of Tice & Bratslavsky (2000) that this may not always be the case. When participants, who felt sad, were told that eating (also a strategy to reduce your negative feelings) does not make you feel better after all, they did not eat more

snacks than happy participants. Therefore, participants in the sad condition used conscious and deliberate strategies to make themselves feel better. Only when it is expected that eating improves your mood, you give in to this way of emotion regulation. In general, this means that if you think your current feeling state can be improved, you chose emotion regulation over self-control; you sacrifice your long-term goals for short-term mood repair. However, if you think your current state is unchangeable, you exert self-control. Tice and Bratslavsky (2000) concluded from these results that emotion regulation has more priority than self-control and even undermines other self-control efforts. They also believe that prioritizing emotion regulation can be seen as misregulation (a form of self-control failure). This occurs when a strategy is used, which is ineffective or backfires. It leads to failure of achieving long-term goals and can also lead to a failure of emotion regulation; to feel better now, at the cost of long-term goals, can have negative effects for your mood. For example, your diet is giving you distress. In a weak moment, you ate a cookie. However, a consequence can be that you are disappointed in yourself, because you could not stick to your diet. In the long-term, this leads to even feeling worse than in the beginning.

Tice and Bratslavsky (2000), as Evers (2018) does, agree on a relation between self-control and reappraisal (and emotion regulation in general). However, it is still unclear in what direction this relation is and if it is positive or negative. Until now, it is only mentioned that in some circumstances long-term goals are sacrificed for short-term emotion regulation. However, long-term goals can be saved, when it is realised that giving into short-term emotion regulation is leading to an even worse feeling in the end. It could be that reappraisal is used: the situation is placed in perspective and it is realised that you will not be better off. As a result thoughts about your sadness changed. Therefore, short-term temptations are put aside. Moreover, Koole (2009) argues that goal achievement is a function of emotion regulation.

By realising that giving into temptations does not make you feel better, a long-term goal may be used as a motivator (because you want to feel happy in the long run). This leads to the idea that long-term goals can serve as a motivator that connects self-control and reappraisal positively with each other.

## Current study

It could be that motivating reappraisal by long-term goals is the missing link. This study attempts to show that self-control and reappraisal are positively related. This leads to the research question: how are self-control and reappraisal correlated? It is hypothesized that reappraisal and self-control positively correlate, only when reappraisal is motivated by achieving long-term goals. However, there is also an underlying assumption; by using reappraisal the experienced emotion will reduce, which causes less impact of emotions and creates more room for exerting self-control. Put together, the two hypotheses are:

1. Reappraisal and self-control only correlate positively, when reappraisal is motivated by attaining long-term goals. Therefore, only condition three (reappraisal manipulation with long-term goals) will show a positive and significant correlation between self-control and reappraisal. Condition one (control) and two (reappraisal manipulation with short-term goals), will not show a correlation.
2. Reappraisal reduces the experienced emotion. In conditions two (reappraisal short-term) and three (reappraisal long-term) should be less experienced emotion compared to condition one (control).

## Method

### Research participants

All the participants were between 18 and 65 years old and were not color blind. Another criterion to be able to participate was that participants needed a laptop for participating. In total, 88 participants participated in this experiment. Gorilla, an online program where researchers can build an online experiment, automatically excluded 149 participants since they did not finish the experiment. This also includes all the individuals who clicked on the experiment link and decided to do it another time. This partly explains the high dropout rate. At times, there were also some internet-connection problems. After this, no participants were excluded. The sample constituted of 36.3% men and 63.6% women, the age ranged from 18 to 65 years with an average of 31.5 years old (*SD* = 13). Most participants were working class (43.2%) and students (52.3%). In Table 1 the descriptive statistics per condition can be found

Table 1

*Descriptives per condition*

| Condition | N | Age | | Gender | Life situation | | | |
|---|---|---|---|---|---|---|---|---|
| | | M [range] | SD | % men | % student | % working | % unemployed | % retired |
| 1. Control | 31 | 31 [19-62] | 11.6 | 29 | 58 | 39 | 0 | 3 |
| 2. Short-term | 32 | 31 [19-65] | 12.7 | 34 | 53 | 44 | 3 | 0 |
| 3. Long-term | 25 | 34 [18-63] | 15.2 | 48 | 44 | 48 | 4 | 4 |

These participants were gathered online. Different e-mail groups of the researcher were approached. These groups were reminded twice by WhatsApp and E-mail. Furthermore, a message on Facebook and LinkedIn was sent. This message was shared a couple of times. To seduce individuals to participate, five coupons were raffled.

A statistical power analysis was conducted in G*Power 3.1.9.2. to estimate the required sample size, based on data from research of Carlson and Wang (2007), where self-control and emotion regulation were correlated amongst preschool children from 4-6 years ($N$=53). The effect size in this research was $r(49)=0.35$, which is a medium to large effect according to Cohen's (1992) criteria. With an alpha of .05 and a desired power of 0.8, the required sample size to detect such an effect is at least 192 participants in total.

**Instruments**

Participants were randomly assigned to one of the three conditions, with different instructions of reappraisal. Condition one was the control condition, where there was a focus on watching the clip normally without explanations about any form of emotion regulation. Condition two was the short-term goal condition. Explanations and examples of reappraisal were given, with a focus on short term benefits of reappraisal. The third condition was the long-term goal condition, where the same explanations and examples of reappraisal were given, only with emphasis on long-term benefits. The complete instructions (including the informed consent and debriefing) can be found in Appendix A.

In the experiment, a clip has been showed. This clip is used in earlier research and it is proven that it evokes sadness (Schaefer, Nils, Sanchez, & Philippot, 2005). The clip was a sad scene from the movie City of Angels, were a woman dies in a traffic accident. It took around four minutes. Although, the experiment was conducted in Dutch, the clip was spoken in English and had no subtitles. Footage of the clip can be found in Appendix B.

**Reappraisal.** The dependent variables are the scores of reappraisal and the scores of self-control. To get an indication to what extent participants used reappraisal, a pretest question and posttest question were asked on how a participant felt at that moment. With a slider, the participant answered the question to what extent he/she felt happy, sad, angry and anxious (e.g.: *In hoeverre voelt u zich blij?*). The answering scales ranged from not at all happy (*helemaal niet blij*) to very happy (*heel erg blij*). Although, the numbers were not visible, the sliders ranged from 0 to 10. For every emotion there was a separate question and slider. These questions were asked twice, once before and once after reading the instructions and watching the clip, functioning as a pretest and posttest.

To check if participants followed their instructions, two questions were asked – to what extent participants reappraised their emotions during the clip (*In hoeverre heeft u uw emoties geherwaardeerd tijdens het kijken van het filmfragment)* and to what extent they watched the clip like they normally would do *(In hoeverre heeft u naar het fragment gekeken zoals u altijd doet?*). Furthermore, there were five control questions that asked to what extent participants reappraised their emotion during the clip (e.g., to what extent did you kept in mind that this happening was staged? And, to what extent did you watch the clip from another perspective than the main character?). All the questions were answered with a slider, ranging from not at all *(helemaal niet)* to very (*helemaal wel)*. Although, the numbers were not visible, the sliders ranged from 0 to 10. See Appendix C for all the questions.

**Self-control.** Self-control is measured by means of the Stroop-task. The core of this task is to suppress your automatic behavior to read the word and instead react on the color of the word (word reading versus color naming). The difficulty of this task is that the words are also colors. For example, there is the word green which is displayed in green. However, there is also the word green displayed in orange. The first example is a congruent combination and the latter example is an incongruent combination. With the Stroop-task interference between incongruent and congruent combinations can be measured. In general, people react faster on color naming when the combination is congruent compared to color naming when the combination is incongruent. When colors do not agree, it takes more cognitive resources to ignore your automatic behaviour to read the written color. When there is less interference, there is not much difference between reaction times on congruent and incongruent combinations. Someone with more self-control should be better in suppressing automatic behavior and should experience fewer difficulties with doing the Stroop-task. This results in faster responses and fewer mistakes for individuals with more self-control (Macleod, 1991).

In this experiment, the Stroop-task consisted of (in)congruent combinations of four colors: red, orange, purple and green. The task was to press the button of the first letter of the color of the word (and not the color that was written): R, O, P or G. It was emphasized that participants should react as fast and accurate as possible. Consequently, participants' reaction times were measured. Every combination was shown for 2000 milliseconds. After a combination, a fixation cross was displayed for 500 milliseconds. Before and after the fixation cross, there was also a short pause of 500 milliseconds. After 1500 milliseconds in total, the next combination came. Participants got also feedback when they were too slow *(niet snel genoeg)* or when they made a mistake (*foutje!*). In one trial, there were 12 congruent combinations, and 36 incongruent combinations. All the combinations were shown three times. The order of the combinations was in every trial random. In total there were 48 randomized combinations shown for every participant. Before the trial started, participants had the possibility to practice the task before the real test started. In this way, they had some time to get used to the keys they had to press. This was also done to protect the internal validity, to prevent measuring how skillful participants were with a keyboard instead of the Stroop-task. The practice trial consisted of three congruent and seven incongruent combinations, which were randomly displayed. It had the same time amounts as the real task (per combination 2000 milliseconds and 1500 milliseconds between combinations). Images of all the (in)congruent combinations can be found in Appendix D.

Since the Stroop-task was the second part of the experiment, it could be that participants were already depleted. According to the limited source model, one act of self-control reduces your total of self-control and this affects your following activities. This could lead to ego depletion (Muraven & Baumeister, 2000). To protect the internal validity and to prevent ego depletion, a break was installed before the Stroop-task started. This break consisted of 30 seconds, where participants were instructed to relax and not get distracted. It was also instructed that this was needed to prepare for the next test. To help participants relax, a clip of a beach with palm trees, ocean and background vocals of the sea and birds was shown. The image of this clip can also be found in Appendix B.

In the end, three demographic questions were asked about gender (male, female and other), age ranging from 18 to 65 years, and life situation (student, working, unemployed, and retired).

**Analysis plan**

The extent a participant used reappraisal was indirectly measured by the difference of experienced sadness before and after the clip. Pre and post sadness was measured in order to compare the three conditions and check if the different instructions worked. It was expected that due to the use of reappraisal, participants would experience less sadness compared to not using reappraisal. Thus, it is assumed that a smaller difference of experienced sadness before and after the clip, results indirectly in the use of more reappraisal. When reappraisal is used in the result section, it should be kept in mind that the researcher is talking about differences between mean scores of experienced sadness. To analyze differences between the mean scores of the three conditions before and after the clip, an ANOVA was conducted.

Second, self-control was analyzed. The level of self-control per participant was measured by the difference between the mean reaction time of a congruent combination and the mean reaction time of an incongruent combination. Therefore, the mean reaction time per person of incongruent combinations was subtracted from the mean reaction times per person of congruent combinations. A positive difference means that participants were faster on congruent than on incongruent combinations. Smaller differences reflect higher self-control, as people with more self-control are able to react faster to both (in)congruent combinations.

Third, a correlation between self-control and reappraisal was analyzed. This was done by split-file, whereby cases where sorted on condition. After this, a bivariate correlation test was performed between self-control and reappraisal per condition.

## Results

The data was analyzed with IBM SPSS Statistics 25. All the variables were at ratio-level.

**Randomization check**

To check if the three conditions were equally divided, a randomization check was done. A MANOVA revealed that gender ($F(2, 85)=1.11$, $p=.335$), life situation ($F(2, 85)=0.73$, $p=.486$), age ($F(2,85)=0.57$, $p=.559$) and sadness before the clip ($F(2, 85)=2.02$, $p=.140$) were not significantly different between the three conditions. Experienced sadness before the clip is included in Table 3.

**Check for the clip.** To check if the clip of City of Angels, evoked the right emotions, the means of every emotion before and after watching, were analyzed by a paired samples t-test. Mean differences and standard deviations, can be found in Table 2. Participants were more sad, angry and anxious and less happy after watching the clip.

Table 2

*Mean differences and standard deviations per emotion*

| **Emotion** | **MD** | **SD** |
|---|---|---|
| Happiness | 1.44** | 2.11 |
| Sadness | -1.69** | 2.39 |
| Anger | -.64** | -1.81 |
| Anxiety | -.48* | 1.71 |

** = significant (p <.01); * = significant (p < .05)

**Manipulation check**

There were seven questions to check if the manipulation worked. In Table 3 the different means and standard deviations of questions can be found. Only the last question significantly differed between the conditions, however not as expected.

**Reappraisal**

Before doing the one-way ANOVA, the assumptions of scale of measurement, independence, normality, and homogeneity of variance were checked. Reappraisal is of ration/interval level and the condition where a participant is in is of nominal level. According to the Shapiro-Wilk test none of the three conditions are distributed normally, ($p_{control}$=.002, $p_{short}$=.001, $p_{long}$=.003). Also, after inspecting the skewness and kurtosis, it appeared that the distribution is not normal. Furthermore, the assumption of homogeneity was violated; the Levene's statistic was significant, $F(2,85)=2.40$, $p$=.007. By doing the Welch statistics, the equality of means was still not significant, $F(2,85)=2.41$, $p$=.158. According to the boxplot of sadness scores, there were no significant outliers.

Although, the conditions with a manipulation of reappraisal had smaller mean differences than the condition without reappraisal ($M_{control}$=2.42 $SD_{control}$=2.81, $M_{short}$=1.44 $SD_{short}$=1.74, $M_{lang}$=1.12, $SD_{long}$ =2.42), the one-way ANOVA indicated that the extent of using reappraisal did not differ significant between the three conditions, $F(2,85)=2.4$, $p$=.097, $n^2$ =.051.

**Second test of reappraisal.** However, there is a second way to measure reappraisal, namely by the first question of the manipulation check (to what extent did you use reappraisal?). The means and standard deviations of this question can be found in Table 3; the means per condition were almost equal. That is why, the one-way ANOVA based on this

question, indicated that the extent of reappraisal did not differ significantly between the three conditions, $F(2,85) = .0047$, $p = .954$, $n^2 = .001$.

Table 3

*Means and Standard deviations per condition of sadness and seven questions.*

| **Sadness** | **C** | **M** | **SD** |
|---|---|---|---|
| Pretest | 1 | 1.32 | 1.7 |
| | 2 | 1.78 | 1.68 |
| | 3 | 2.36 | 2.41 |
| Posttest | | | |
| | 1 | 3.74 | 2.76 |
| | 2 | 3.22 | 2.15 |
| | 3 | 3.48 | 2.42 |
| **Questions** | **C** | **M** | **SD** |
| To what extent did you use reappraisal during watching the clip? | 1 | 4.68 | 3.06 |
| | 2 | 4.88 | 3.04 |
| | 3 | 4.68 | 2.45 |
| To what extent did you watch like you normally would do? | | | |
| | 1 | 5.97 | 3.39 |
| | 2 | 7.25 | 2.78 |
| | 3 | 6.88 | 2.49 |
| To what extent did you suppress your emotions? | | | |
| | 1 | 5.19 | 3.11 |
| | 2 | 5.34 | 2.77 |
| | 3 | 4.64 | 2.64 |
| To what extent did you express your emotions? | | | |
| | 1 | 2.97 | 2.87 |
| | 2 | 4.09 | 3.14 |
| | 3 | 3.60 | 3.00 |
| To what extent did you kept in mind that his scene was staged? | | | |
| | 1 | 3.48 | 2.93 |
| | 2 | 2.09 | 1.94 |
| | 3 | 2.72 | 2.13 |
| To what extent did you emphasize with the main character? | | | |

| | | | |
|---|---|---|---|
| | 1 | 5.23 | 2.64 |
| | 2 | 3.66 | 2.46 |
| | 3 | 4.32 | 2.70 |
| To what extent did you watch the clip from another perspective as that from the main character? * | | | |
| | 1 | 7.39 | 2.16 |
| | 2 | 5.34 | 2.98 |
| | 3 | 6.96 | 2.05 |

*=significant (p<.05)

C1=control condition, C2=reappraisal short-term condition, C3= reappraisal long-term condition.

**Self-control**

The mean reaction time for congruent combinations was 824 milliseconds (*SD* = 208) and the mean reaction time for incongruent combinations was 937 milliseconds (*SD* = 189). In general, participants reacted faster on congruent (green in green) than incongruent (green in orange) combinations.

**Reappraisal and Self-control**

Assumptions for independence, normality, linearity, and homoscedasticity to do a bivariate correlation test, were checked for both reappraisal and self-control. As already mentioned, reappraisal is not normally distributed, while self-control is, according to the Shapiro-Wilk test ($p < .114$). After a visual inspection of a scatterplot of reappraisal against self-control, it appeared that there is no linear relationship between these variables. For the next statistics, Spearman's Rho was used. It indicated that there is no correlation between reappraisal and self-control, $r_s$=-.019, $p$=.861, two-tailed, $N$=88. Also, correlations per condition where not significant. More information on these correlations can be found in Table 4. When repeating the same analysis with reappraisal based on the question and self-control, it provided the same outcomes, $r_s$=.129, $p$=.233, two-tailed, $N$=88. After the analysis per condition, again, in condition three, there were no significant results, $r_s$=.093, $p$=.657, two-tailed, $n$=25.

Table 4

*Correlations between reappraisal and self-control per condition*

| **Condition** | | **Reappraisal** | **Self-control** | **N** |
|---|---|---|---|---|
| 1. Control | Reappraisal | 1 | -.007$^{ns}$ | 31 |
| | Self-control | -.007$^{ns}$ | 1 | |
| 2. Short | Reappraisal | 1 | .093$^{ns}$ | 32 |
| | Self-control | .093$^{ns}$ | 1 | |
| 3. Long | Reappraisal | 1 | -.060$^{ns}$ | 25 |
| | Self-control | -.060$^{ns}$ | 1 | |

$^{ns}$ = not significant ($p > .05$)

When repeating the same analysis with reappraisal based on the question and self-control, it provided the same outcomes, $r_s$=.129, $p$=.233, two-tailed, $N$=88. After the analysis per condition, again, in condition three, there were no significant results, $r_s$=.093, $p$=.657, two-tailed, $n$=25.

**Additional analyses.** Next to sadness, also other emotions before and after watching the clip were tested. It appeared that anger was significantly different between conditions, $F(2,85)=3.497$, $p$=.035, $n^2$=.076. Post hoc analyses with Tukey's HSD (α=.05) revealed that experienced anger, significantly differed between the control condition ($M$=1.3, $SD$=2.27) and the reappraisal long-term condition ($M$=0.1, $SD$=1.45). Thus, indirectly, this means that in the latter condition, more reappraisal was used. Effect sizes for this comparison were $d$=.537, this is a medium effect according to Cohen's guidelines (1992). However, reappraisal (anger) did also not correlate with self-control in the condition with long-term goals, $r$=.02, $p$=.924, two-tailed, $n$=25.

## Discussion

The main question of this study was to investigate how reappraisal and self-control are correlated. The results illustrate that this does not seem to be the case. In all three conditions, no correlation between self-control and reappraisal was found. However, for the control condition and the condition with reappraisal short-term goals, this was as predicted. This means that long-term goals, in this study, are not the missing link to connect reappraisal and self-control. For daily life, this means that reappraisal does not influence self-control and vice versa. This prevents two things: in case of a negative relation, you do not have to be concerned that using reappraisal as a strategy threats your amount of self-control and

achieving long-term goals. On the other hand, in case of a positive relation, the opportunity for collaboration between reappraisal and self-control is also gone. This cooperation may make you even better in achieving goals. From this study the direction cannot be pointed out, but from literature it is likely that the relation is positive and if there truly is no relation between reappraisal and self-control, the opportunity for collaboration is gone. Researchers like Evers, Sheppes and Meiran, Koole, Tice and Bratslavsky all argue that there is a relation. Thus, there is still a lot of ambiguity. For science this means, that there is a lot of research to do, to find out if reappraisal and self-control are related and whether this is positive or negative.

**Implicit emotion regulation**

The discrepancy between the literature and the results of this study can be explained by several theories and limitations. Many emotion regulation strategies are seen as effortful and deliberate processes, however, some emotion regulation processes are relatively automatic. This means that implicit emotion regulation operates unconsciously or without explicit intentions. Still, with the aim to modify, maintain, increase or decrease an emotional response. Implicit emotion regulation may have big influence on our daily life. However, we are not aware of this form of emotion regulation and we do not have the intention to regulate an emotional response. Research to implicit emotion regulation is difficult because, it is not clear when it occurs and when an emotion is regulated instead of unregulated. For this study, the discussion about research to implicit emotion regulation is too broad (see Koole & Rothermund, 2011) for defining this topic and an overview of several studies (Evers, 2018; Koole & Rothermund, 2011).

For this study, it is important to realize that this view on emotion regulation has no involvement with self-control. This may lead to no relation between implicit emotion regulation strategies and self-control. However, in this experiment it was explicitly stated how to use reappraisal during the clip. Thus, it is assumed that participants used explicit emotion regulation, although this cannot be checked. Furthermore, it is showed that there were no differences between the conditions on the extent reappraisal was used. Moreover, participants indicated in all three conditions to have used little reappraisal. Perhaps reappraisal was still working on an implicit level. If the participants may not have realized that they reappraised emotions, this might help explain why a relation between reappraisal and self-control was not observed.

**Online emotion regulation**

To take the discussion a step further, there is also online emotion regulation. Sheppes and Meiran (2007) developed online emotion regulation, based on the limitations of the process model of Gross (1998a; 1998b). This study uses Gross' process model. As a result, all different strategies (situation selection, situation modification, attentional deployment, reappraisal and suppression) are described as linear, simple and causal processes based on the timing from antecedent-focused to response-focused. However, Meiran and Sheppes (2007) argue that there are multiple interactions and a strategy can be used in any point of time after an emotional response appeared. Thus, reappraisal can also be used after an emotion is already present. According to Gross (1998a; 1998b) reappraisal is antecedent-focused and only operates before an emotion is present. Because reappraisal is antecedent-focused it costs less self-control, because this is the optimal time point. However, Meiran and Sheppes (2007) showed in their studies that reappraisal can also be used after this optimal time point, however with a negative effect on self-control and even leading to ego depletion. Perhaps, timing has more influence on the relation between self-control and emotion regulation compared to a particular strategy. It even can be possible that the timing determines the direction of the relation between any regulation strategy and self-control; regulating before the emotion saves self-control and regulating after the emotion costs self-control. Further research has to point out if this is true.

**Choosing not to control?**

As already mentioned, there are different views on self-control failure. Instead of viewing self-control as a source that can be depleted (ego depletion), also motivation and justification can lead to self-control failure. For example, you give in to buying the cookies because you received a very good grade for your test. In this case you buy cookies because you justified your behavior instead of not having the ability anymore to ignore temptations. In the current experiment there was a break implemented to prevent ego depletion. However, the motivational aspect was not taken into account. Thus, self-control failure was still possible due to a lack of motivation or attention during the Stroop-task. Future research has to find out how influential justifications are (Evers, 2018; De Witt Huberts, Evers & De Ridder; 2014).

**Limitations**

This study has some limitations. It appears from the results (Table 3) that participants did not follow their instructions. The question about the extent participants used reappraisal was not answered as expected: participants from the 'reappraisal conditions' indicated that

they used less reappraisal compared to the control condition. Moreover, when it was asked to what extent participants watched the clip like they always do (instructions for the control condition), it appeared that the 'reappraisal conditions' score was higher than the control condition. It looks like the control condition did a better job at reappraising and this was not as planned. From these results it is concluded that participants did not follow their instructions carefully. It is very likely that the manipulation did not work as expected. Thus, the reader should be careful and critical by interpreting the results.

Another methodological implication is to add a question in the end which is asking to what extent participants were influenced by achieving the goal mentioned in the text. In this way, it can be checked if the manipulation for goals worked correctly. In this study, this was not included.

However, the most important limitation is that the reliability of these results is threatened due to a low power. There were not enough participants to generalize these data (88 instead of 197 participants). A low statistical power can cause a misrepresentation of the results. In this study, it appeared that there was no relation, however from literature there is evidence that there should be a relation. It could be argued that this study is based on a type II error; wrongly failing to reject the null hypothesis. This causes unreliable results.

## Conclusion

To conclude, differences between implicit and explicit emotion regulation could be the answer for finding no correlation between reappraisal and self-control. Although, it is more likely that deficits in the study itself caused the not predicted results. Moreover, it should kept in mind that due to a low power the results can be misrepresented. Thus, long-term goals could be still the missing link. Furthermore, this study has several leads for future research about self-control and emotion regulation. Differences between and consequences of implicit and explicit emotion regulation should be more clarified. This is also convenient to use during developing new experiments. Moreover, the impact of the timing of regulation should be further researched on. Perhaps, timing has more influence on self-control than any emotion regulation strategy. Lastly, the debate about self-control failure is not yet closed. Are people motivated to not exert self-control by justifications or are people not able to exert self-control because their source of self-control is depleted? Future research has to find out. At least, this study proves that there is still much to do for researchers to clarify these topics.

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## Appendix A

Instructions of the experiment (A1), informed consent (A2) and debriefing (A3).

**A1**

**Instructions condition 3**. Het onderzoek is begonnen! Onderstaand stuk tekst is belangrijk voor het onderzoek, dus lees dit aandachtig door.
Iedereen is wel eens een keer emotioneel, soms is het goed om meteen die emotie te uiten, maar dit kan ook verkeerd uitpakken: u zegt bijvoorbeeld dingen die u niet wilde. Er zijn verschillende manieren om met uw emoties om te gaan. In dit onderzoek gaat u de beste manier aanleren om met emoties om te gaan, namelijk om uw emoties te 'herwaarderen'. Dit betekent dat u de situatie (in gedachte) zo verandert, dat emoties minder impact hebben.

Hoe doet u dit? Er zijn verschillende manieren om uw emoties te herwaarderen. Hieronder volgt een aantal voorbeelden:

1. Als u boos bent op iemand omdat deze persoon u duwde, dan kunt u deze boosheid uiten, maar u kunt ook de situatie in een ander perspectief plaatsen: deze persoon duwde u niet met opzet.
2. U kunt ook op een letterlijke manier iets van ander perspectief bekijken, bijvoorbeeld bij een enge film: om het minder eng te maken kunt u de film bekijken vanuit het perspectief van de cameraman.
3. Ook bij een zielige film kunt u het 'herwaarderen' van emoties toepassen: u kunt bijvoorbeeld onthouden dat het hier niet gaat om echte mensen maar om acteurs.

Op deze manier met emoties omgaan heeft veel positieve effecten op uw leven. Op langere termijn leidt het tot een hogere kwaliteit van leven, betere gezondheid, meer zelfvertrouwen en betere relaties met anderen. Het is dus niet alleen handig om emoties te 'herwaarderen' tijdens dit onderzoekje, maar ook om dit toe te passen in de rest van uw leven!

Het filmfragment kan bepaalde emoties kan oproepen. Om een gelukkiger leven te kunnen leiden is het van belang dat u de emoties die u ervaart kunt herwaarderen. Probeer herwaardering zoals hierboven beschreven toe te passen tijdens het kijken van het fragment en waarschijnlijk heeft u er na dit onderzoekje ook nog wat aan! Succes!

**Instructions condition 2.** Het onderzoek is begonnen! Onderstaand stuk tekst is belangrijk voor het onderzoek, dus lees dit aandachtig door.

Iedereen is wel eens een keer emotioneel, soms is het goed om meteen die emotie te uiten, maar dit kan ook verkeerd uitpakken: u zegt bijvoorbeeld dingen die u niet wilde. Er zijn verschillende manieren om met uw emoties om te gaan. In dit onderzoek gaat u de beste manier aanleren om met emoties om te gaan, namelijk om uw emoties te 'herwaarderen'. Dit betekent dat u de situatie (in gedachte) zo verandert, dat emoties minder impact hebben.

Hoe doet u dit? Er zijn verschillende manieren om uw emoties te herwaarderen. Hieronder volgt een aantal voorbeelden:

1. Als u boos bent op iemand omdat deze persoon u duwde, dan kunt u deze boosheid uiten, maar u kunt ook de situatie in een ander perspectief plaatsen: deze persoon duwde u niet met opzet.
2. U kunt ook op een letterlijke manier iets van ander perspectief bekijken, bijvoorbeeld bij een enge film: om het minder eng te maken kunt u de film bekijken vanuit het perspectief van de cameraman.
3. Ook bij een zielige film kunt u het 'herwaarderen' van emoties toepassen: u kunt bijvoorbeeld onthouden dat het hier niet gaat om echte mensen maar om acteurs.

Wanneer u op deze manier met emoties omgaat, heeft u daar onmiddellijk baat bij. Het is dus niet alleen handig om emoties te 'herwaarderen' tijdens dit onderzoekje, maar ook om meteen toe te passen.

Het filmfragment kan bepaalde emoties kan oproepen. Voor dit onderzoek is het van belang dat u de emoties die u ervaart, herwaardeert. Probeer herwaardering zoals hierboven beschreven toe te passen tijdens het kijken van het fragment! Succes!

**Instructions condition 1.** Het onderzoek is begonnen! Onderstaand stuk tekst is belangrijk voor het onderzoek, dus lees dit aandachtig door.

Er zijn verschillende manieren om met uw emoties om te gaan. Iedereen doet dit op zijn/haar eigen manier, maar de ene manier is niet per se beter dan de andere. En wat in de ene situatie goed werkt, werkt in de andere situatie juist weer minder goed.

Het filmfragment kan bepaalde emoties kan oproepen. Het is belangrijk dat u naar dit fragment kijkt zoals u dat altijd doet. Voor dit onderzoek is het van belang dat u het fragment gewoon op u af laat komen. Succes!

**A2**

**Informed consent.** Beste deelnemer,
Hartelijk dank dat u mij wilt helpen met afstuderen! Welkom bij dit onderzoek over emoties. U kunt een filmpje, een aantal vragen en een kort testje verwachten. Voor dit korte testje is het belangrijk dat u kleuren kunt onderscheiden. Bent u kleurenblind? Dan kunt u helaas niet meedoen. Verder is het belangrijk dat u dit onderzoek op een PC, laptop of tablet afneemt. Het moet een apparaat zijn met toetsenbord, aangezien deze nodig is voor het testje. Op een smartphone komt het toetsenbord niet in beeld en kunt u dus niet meedoen.

Aan het einde van het onderzoek wordt het onderzoeksdoel verteld en krijgt u meer uitleg over de dingen die u daarvoor hebt gedaan. Het onderzoek duurt ongeveer 15 minuten (waarvan 5 minuten een filmpje en een ‘pauze’). U maakt kans op één van de 5 bol.com bonnen die eind mei zullen worden verloot. Dit geldt alleen wanneer u het onderzoek helemaal afrond.

Voor vragen, klachten en/of opmerkingen over het onderzoek kunt u altijd contact op nemen via e-mail: j.c.steverink@students.uu.nl

Ik bevestig dat ik tussen de 18-65 jaar ben, dat ik niet kleurenblind ben en dat ik het onderzoek nauwkeurig en serieus zal doorlopen.

Wanneer u op onderstaande ‘next’-knop drukt, gaat u akkoord met het volgende:

- Ik ben goed geïnformeerd over het onderzoek. Ik heb bovenstaande informatie over het onderzoek gelezen, de gelegenheid gekregen om vragen te stellen over de uitvoering van het onderzoek (per email) en na te denken over mijn deelname.

- Niettemin begrijp ik en stem ik ermee in dat meer gedetailleerde informatie over het doel van het onderzoek nog niet vooraf aan mij kan worden bekendgemaakt, omdat dit de uitkomsten van mijn deelname kan vertekenen. Na afloop van mijn deelname krijg ik direct meer informatie.
- Om dezelfde reden stem ik ermee in om details over de inhoud van het onderzoek voor mezelf te houden en deze niet te delen met mede-participanten totdat de studie is afgerond (per 29 augustus 2018) omdat dit de uitkomsten van het onderzoek in negatieve zin zou kunnen beïnvloeden.
- Mijn deelname is geheel vrijwillig. Ik heb het recht om ten allen tijde de toestemming die ik verleen weer in te trekken en mijn deelname aan het onderzoek te stoppen, zonder hiervoor een reden op te geven.

De onderzoeksgegevens worden gecodeerd geanalyseerd. Bij publicatie van de data wordt er zorgvuldig op gelet dat de gegevens niet individueel herkenbaar zijn.

**A3**

**Debriefing**. Graag wil ik u bedanken voor het meedoen aan dit onderzoek! Door mee te doen heeft u mij helpen afstuderen. U heeft informatie gegeven over hoe u met emoties omgaat en u heeft een testje gedaan dat wilskracht meet.

Een gedeelte van de participanten heeft een stuk tekst gelezen over hoe emoties kunnen worden geherwaardeerd (gebeurtenissen in een ander perspectief zien). Daarna kreeg iedereen hetzelfde verdrietige filmpje te zien en werd er bij iedereen gevraagd naar de ervaren emoties. Naar verwachting reageren de mensen die hebben gelezen over het herwaarderen van emoties minder heftig op het filmpje doordat ze zich bijvoorbeeld bedenken dat het niet echt is.
Daarnaast heb ik de mate van wilskracht gemeten door middel van de Stroop taak. Dit was het testje met de kleuren. Hierbij is wilskracht nodig om u in te houden en niet op de betekenis van het woord te reageren, maar op de inktkleur. Hoe meer wilskracht iemand heeft, hoe sneller diegene accuraat kan reageren.

Er wordt vaak gesuggereerd dat het controleren van emoties ook een vorm van wilskracht is, waarbij men zich moet inhouden om niet de emotie te uiten, maar deze probeert te herwaarderen. Verrassend genoeg is er echter nog geen onderzoek gedaan naar de

overeenkomsten en verschillen tussen het controleren van emoties en wilskracht. Door mee te doen aan dit onderzoek, heeft u meer inzicht gegeven in dit nog weinig onderzochte onderwerp. Een echte toevoeging dus aan de wetenschap!

Als u de resultaten van dit onderzoek wilt ontvangen, of indien u vragen hebt met betrekking tot het onderzoek, dan kunt u mailen naar de uitvoerende onderzoeker. U kunt te allen tijde contact opnemen met de uitvoerende onderzoeker en/of hoofdonderzoeker om persoonsgegevens in te zien of een verzoek in te dienen om uw gegevens alsnog te vernietigen (dat altijd gehonoreerd zal worden). Voor klachten kunt u contact opnemen met de hoofdonderzoeker.

Mocht u kans willen maken op één van de 5 bol.com bonnen, dan kunt u via deze link uw e-mailadres achterlaten: https://goo.gl/forms/6zKWduZinEtywfFW2

Met vriendelijke groet en nogmaals dank,
Uitvoerend onderzoeker: Jeanne Steverink (j.c.steverink@students.uu.nl)
Hoofdonderzoeker: dr. Anouk van der Weiden (a.vanderweiden@uu.nl)

## Appendix B

Images of showed stimuli; break (B1) and clip from City of Angels (B2).

### B1: Break

### B2: City of Angels

## Appendix C

Control questions for instructions

1. To what extent did you use reappraisal during watching the clip?
2. To what extent did you watch like you normally would do?
3. To what extent did you suppress your emotions?
4. To what extent did you express your emotions?
5. To what extent did you kept in mind that his scene was staged?
6. To what extent did you emphasize with the main character?
7. To what extent did you watch the clip from another perspective as that from the main character?

**Appendix D**

Stimuli for the Stoop-task