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# Successful emotion regulation requires both conviction and skill: beliefs about the controllability of emotions, reappraisal, and regulation success

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## ABSTRACT

To succeed in self-regulation, people need to believe that it is possible to change behaviour and they also need to use effective means to enable such a change. We propose that this also applies to emotion regulation. In two studies, we found that people were most successful in emotion regulation, the more they believed emotions can be controlled and the more they used an effective emotion regulation strategy – namely, cognitive reappraisal. Cognitive reappraisal moderated the link between beliefs about the controllability of emotion and success in emotion regulation, when reappraisal was measured as a trait (Study 1) or manipulated (Study 2). Such moderation was found when examining the regulation of disgust elicited by emotion-inducing films (Study 1), and the regulation of anger elicited by real political events (Study 2). We discuss the implications of our findings for research and practice in emotion regulation.

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## KEYWORDS

Emotion; emotion regulation; incremental beliefs; reappraisal

To achieve desired outcomes, people need both conviction and skill. For example, to achieve academic success, people need to believe that academic success is possible, and they need to use effective learning strategies to bring about such success. We propose that the same applies to emotion regulation. To regulate emotions effectively, people need to believe that it is possible to regulate emotions, and they must use effective emotion regulation strategies to successfully regulate their emotions. According to this proposal, success in emotion regulation should increase the more people believe emotions are controllable and the more they use effective regulation strategies, such as cognitive reappraisal. Below, we review research on beliefs about the controllability of emotions and on cognitive reappraisal, and explain why both may inter-actively contribute to successful emotion regulation.

## Beliefs about the controllability of emotions

People cultivate beliefs about the controllability of human attributes (i.e. “implicit theories”; Dweck,

Chiu, & Hong, 1995). For example, people cultivate beliefs about the controllability of intelligence (Blackwell, Trzesniewski, & Dweck, 2007), personality traits (Chiu, Hong, & Dweck, 1997), weight management (Burnette, 2010), leadership (Hoyt, Burnette, & Innella, 2012), and groups (Halperin, Russell, Trzesniewski, Gross, & Dweck, 2011). People who endorse incremental beliefs believe that the target attribute can be controlled, whereas people who endorse entity beliefs believe that the attribute is fixed and cannot be changed. The more people believe a certain attribute is controllable, the more likely they are to try to change it. As a result, they are ultimately more likely to effectively change the attribute in a desired direction. For example, the more students cultivated incremental beliefs of intelligence, the more they were motivated to work hard in their math class, resulting in higher math achievements (Blackwell et al., 2007).

People also cultivate beliefs about the controllability of emotions (Tamir, John, Srivastava, & Gross, 2007). People who endorse incremental beliefs about emotion believe that emotions can be controlled,

whereas people who endorse entity beliefs believe that emotions cannot be controlled. Those who hold more incremental beliefs about emotion are more likely to try to regulate their emotions when explicitly instructed to do so (Bigman, Mauss, Gross, & Tamir, *in press*). Such individuals also report greater self-efficacy in emotion regulation (Tamir et al., 2007). This self-efficacy, in turn, may lead people to exert greater effort and persist longer in emotion regulation (Schmidt & DeShon, 2010). Incremental beliefs about emotion, therefore, may be linked to more successful emotion regulation. Successful emotion regulation involves changing emotional experience in a desired direction. For instance, to the extent that people are motivated to decrease an unpleasant emotion, greater decreases in that unpleasant emotion would reflect more successful emotion regulation. To regulate emotions successfully, people need not only believe that emotions can be controlled, they also need to have the proper skills to enable effective regulation. One effective strategy for regulating emotions, for example, is cognitive reappraisal.

### **Beliefs about the controllability of emotions and cognitive reappraisal**

Cognitive reappraisal refers to modifying how one thinks about an emotion-eliciting event in order to alter its emotional impact (Gross, 1998). For instance, in order to feel better, upon seeing a sick man at the hospital a person can tell herself that the man is getting treated and will get well soon (Dennis & Hajcak, 2009). Cognitive reappraisal has been found to be an effective emotion regulation strategy (see Webb, Miles, & Sheeran, 2012).

Both incremental beliefs about emotion and cognitive reappraisal have been linked to more effective emotion regulation, but whether and how they operate together remains elusive. We propose that cognitive reappraisal moderates the link between incremental beliefs about emotion and successful emotion regulation. People who believe that emotions are more controllable may have greater conviction and persistence when regulating their emotions. Such persistence, however, is most likely to promote successful emotion regulation when people also use effective regulation tools, such as cognitive reappraisal. Success in emotion regulation would be more likely, therefore, the more people believe that emotions can be controlled and the more likely they are to use cognitive reappraisal. People may be

more likely to use cognitive reappraisal to the extent that they tend to use it frequently (i.e. they are higher on trait reappraisal) or to the extent that they are instructed to use it in a given context. The current investigation tested this hypothesis.

### **The present investigation**

In two studies, we tested whether beliefs about the controllability of emotion and cognitive reappraisal interact to predict successful emotion regulation. Across studies, participants were instructed to regulate emotions in the laboratory, in response to stimuli that elicit negative emotions. In both studies, we measured beliefs about the controllability of emotion. In addition, we either measured the habitual use of cognitive reappraisal (Study 1) or manipulated the momentary use of cognitive reappraisal (Study 2). In Study 1, participants regulated their disgust in response to a disgusting film. In Study 2, participants regulated their anger in responses to anger-inducing political events outside the laboratory. Across studies, we predicted that for successful emotion regulation to occur, incremental beliefs about emotion and cognitive reappraisal need to work in tandem.

### **Study 1**

In Study 1, we examined success in the regulation of disgust, as a function of beliefs about the controllability of emotion and the habitual tendency to use cognitive reappraisal. To ensure that our induction of disgust was strong and consistent across individuals, we used emotion-inducing films. Furthermore, to minimise the chances of carry-over effects, individual differences in beliefs about the controllability of emotion and cognitive reappraisal were assessed a week prior to the completion of the emotion regulation task. Participants were asked to decrease their emotional reactions in response to a disgusting film clip. We hypothesised that people who endorse more incremental beliefs about emotion, and use cognitive reappraisal more frequently, would be most effective in decreasing the disgust they experienced in response to the clip. To show that such an effect is not driven by differences in affective reactivity, we also measured individual differences in two affective dispositions (i.e. neuroticism and extraversion). Finally, to test whether such an effect is specific to cognitive reappraisal, we also measured two other

emotion regulation strategies that are considered less effective in decreasing negative emotions – namely, expressive suppression and rumination (Ray, Wilhelm, & Gross, 2008; Webb et al., 2012).

## Method

### Participants

Fifty-three American undergraduate students (76.6% female,  $M_{\text{age}} = 20.06$ ,  $SD = 2.56$ ) completed the study, as part of a larger research project, for which they received \$30 in total. Of them, 48.4% were Caucasian, 29.7% Asian, and 21.9% other ethnicities.<sup>1</sup>

### Materials

*Beliefs about the controllability of emotion:* Participants completed the Implicit Theories of Emotion Scale (Tamir et al., 2007). The scale includes four items that assess beliefs about the controllability of emotions (e.g. “Everyone can learn to control their emotions”). Participants rated their agreement with each item (1 = strongly disagree; 5 = strongly agree). To compute an incremental (vs. entity) score, we reverse scored two items, and averaged across all items ( $\alpha = .74$ ).

*Cognitive reappraisal and expressive suppression:* Participants completed the reappraisal and suppression subscales of the Emotion Regulation Questionnaire (Gross & John, 2003). The questionnaire includes six items that assess the frequency of using cognitive reappraisal in daily life (e.g. “When I’m faced with a stressful situation, I make myself think about it in a way that helps me stay calm”;  $\alpha = .89$ ), and four items that assess the frequency of using suppression (e.g. “When I am feeling positive emotions, I am careful not to express them”;  $\alpha = .92$ ). Participants rated their agreement with each item (1 = strongly disagree; 7 = strongly agree).

*Disgust:* Participants indicated how *disgusted*, *repulsed* and *unpleasant* they felt (1 = not at all; 7 = very much;  $\alpha = .46$  before watching the film and  $\alpha = .91$  after watching the film).<sup>2</sup>

*Self-reported emotion regulation:* Participants indicated the extent to which they regulated their emotions while watching the film (“As I was watching the film, I tried to control my reactions to it”; “As I was watching the film, I tried to alter the way I was reacting to it”;  $\alpha = .86$ ) on a scale of 1 (= not at all) to 7 (= very much).

*Neuroticism and extraversion:* Neuroticism and extraversion were measured using the respective subscales in Goldberg’s (1999) Big Five International Personality Item Pool (short form). The scale involves rating the accuracy (1 = very inaccurate; 5 = very accurate) of 10 self-describing statements indicative of high or low neuroticism (e.g. “I get stressed out easily”;  $\alpha = .84$ ) and 10 statements indicative of high and low extraversion (e.g. “I am the life of the party”;  $\alpha = .88$ ).

*Rumination:* Rumination was measured by the Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Davis, 1999). The scale includes 22 items describing responses to depressed mood that are self-focused (e.g. I think, “Why do I react this way?”), symptom-focused (e.g. I think about how hard it is to concentrate), and focused on the possible causes and consequences of one’s mood (e.g. I think “I won’t be able to do my job if I don’t snap out of this”). Respondents rated each item on a scale of 1 (= almost never) to 4 (= almost always) ( $\alpha = .90$ ).

### Procedure

The study involved two sessions, administered approximately two weeks apart. In the first session, participants completed measures of cognitive reappraisal, expressive suppression, rumination, extraversion and neuroticism, and beliefs about the controllability of emotions.<sup>3</sup> In the second session, participants were told that they would watch a film clip. To ensure participants watch the clip, they were told that their memory of specific details from the clip would later be tested. Participants were further told that to promote better recall performance, they should try to decrease their emotional reactions to the film as they watch it. Participants then watched a two-minute film clip from the television game show *Fear Factor*, in which contestants were trying to eat a raw pig’s rectum. After watching the film, they indicated how disgusted they felt while watching the film. To support the cover story, participants were then asked to recall neutral visual details from the film.

## Results

As expected, participants reported trying to regulate their emotions while watching the film ( $M = 3.43$ ;  $SD = 1.70$ ). Means, standard deviations, and simple correlations between the key variables are presented in [Table 1](#). We conducted a multiple regression analysis,

with experienced disgust as the outcome variable, and centred cognitive reappraisal, centred incremental theories of emotion, their interaction, and centred experienced disgust at baseline as the independent variables. There was no significant main effect for baseline disgust experience ( $B = -0.23$ ,  $SE = 0.35$ ,  $\beta = -0.09$ ,  $t = -0.65$ ,  $p = .518$ ), for cognitive reappraisal ( $B = -0.25$ ,  $SE = 0.24$ ,  $\beta = -0.16$ ,  $t = -1.06$ ,  $p = .296$ ), or for beliefs about the controllability of emotion ( $B = -0.25$ ,  $SE = 0.31$ ,  $\beta = -0.12$ ,  $t = -0.81$ ,  $p = .423$ ). Finally, as expected, there was a significant Belief  $\times$  Cognitive reappraisal interaction,  $B = -0.71$ ,  $SE = 0.32$ ,  $\beta = -0.30$ ,  $t = -2.24$ ,  $p = .030$ .

In order to compute the simple effects, and to draw Figure 1, we used Hayes (2013) PROCESS bootstrapping command (Model 1: 5000 iterations). As shown in Figure 1, among people higher in cognitive reappraisal, the more they believed emotions are controllable the less negative emotions they tended to feel after the recall,  $B = -1.03$ ,  $SE = 0.48$ ,  $t = -2.17$ ,  $p = .035$ ,  $CI_{95\%} [-1.99, -0.08]$ . In contrast, among people lower in cognitive reappraisal, incremental theories of emotion were unrelated to emotion regulation success,  $B = 0.60$ ,  $SE = 0.48$ ,  $t = 1.25$ ,  $p = .218$ ,  $CI_{95\%} [-0.37, 1.57]$ .<sup>4,5</sup>

To test whether this effect was driven by differences in affective reactivity, we repeated the analyses above with either centred neuroticism or centred extraversion as an additional predictor. The two-way interaction remained significant, even when controlling for neuroticism,  $B = -0.66$ ,  $SE = 0.31$ ,  $\beta = -0.28$ ,  $t = -2.18$ ,  $p = .034$ , and when controlling extraversion,  $B = -0.73$ ,  $SE = 0.33$ ,  $\beta = -0.31$ ,  $t = -2.21$ ,  $p = .032$ .

**Table 1.** Means, standard deviations, and simple correlations between key variables.

	1	2	3	Mean	SD
Study 1 ( $N = 53$ )					
1. Disgust experience before regulation	–			0.43	0.68
2. Disgust experience after regulation	-.08	–		4.87	1.76
3. Beliefs about the controllability of emotions	-.21	-.17	–	3.41	0.84
4. Trait reappraisal	-.26*	-.20	.42**	4.46	1.13
Study 2 ( $N = 58$ )					
1. Anger experience before regulation	–			1.34	0.74
2. Anger experience two weeks after training	.01	–		3.77	1.19
3. Anger experience five months after training	-.14	.39**	–	3.62	1.00
4. Beliefs about the controllability of emotions	-.04	-.07	-.06	3.90	1.11

\* $p < .05$ , \*\* $p < .001$ .

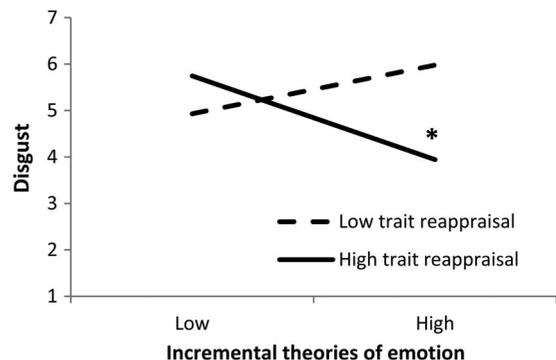
Finally, to test whether our effects were specific to cognitive reappraisal, we repeated the analyses, this time replacing centred reappraisal with either centred suppression or centred rumination. As expected, we did not find a significant two-way interaction between incremental theories about emotion and expressive suppression,  $B = -0.09$ ,  $SE = 0.27$ ,  $\beta = -0.05$ ,  $t = -0.33$ ,  $p = .744$ , or rumination,  $B = 0.04$ ,  $SE = 0.03$ ,  $\beta = 0.19$ ,  $t = 1.38$ ,  $p = .173$ .

## Discussion

The findings in Study 1 are consistent with our moderation hypothesis. Participants who believed emotions were more controllable, and were more likely to use cognitive reappraisal, were more successful in decreasing their experience of disgust in response to the clip. This effect remained even when controlling for individual differences in reactivity (i.e. neuroticism and extraversion). Moreover, this effect was found with the effective strategy of cognitive reappraisal, but not with other less effective strategies, such as expressive suppression and rumination. Studies 1 provide initial correlational evidence for our hypothesis. In Study 2, we tested the role of reappraisal in shaping emotion regulation success, as a function of beliefs about the controllability of emotion.

## Study 2

In Study 2, we tested our predictions in an existing dataset, which was collected as part of a study that tested the effect of cognitive reappraisal on regulating anger in response to political events (Halperin, Porat,



**Figure 1.** Disgust experience following regulation, as a function of incremental theories of emotion and cognitive reappraisal (means in the high and low groups are estimated based on  $\pm 1$  SD from the variable mean; Study 1).

Tamir, & Gross, 2013). Participants in the experimental condition were trained and instructed to use cognitive reappraisal, whereas participants in the control condition were asked to respond naturally. Next, participants were asked to use the strategy that was presented to them (i.e. cognitive reappraisal or spontaneous emotional reactions) in their daily lives during the following week. During that week, the Palestinian bid to the United Nations was announced. Many Jewish Israelis considered that bid an act of betrayal in the negotiations. Participants were contacted again, five months later, and reported on their emotional reactions toward Palestinians.

Incremental beliefs about emotion were measured, but not examined nor reported in the published paper. This presented us with the opportunity of testing the potential role of reappraisal in shaping emotion regulation success, as a function of beliefs about the controllability of emotion, outside the laboratory. We hypothesised that participants who were trained in cognitive reappraisal would be more effective in decreasing their anger in response to political events, but only if they believed emotions are controllable. We did not expect incremental beliefs about emotion to be related to successful emotion regulation among participants who were not trained in using reappraisal.

## Methods

### Participants

Sixty young Jewish Israelis (60.0% female,  $M_{\text{age}} = 17.95$ ,  $SD = 0.29$ ) participated in return for admission to a public lecture. Of those participants, 48 also completed a follow-up five months later.

### Materials

*Beliefs about the controllability of emotion:* Incremental beliefs about emotion were captured with the following item: "Everyone can learn to control their emotions" on a scale of 1 (strongly disagree) to 5 (strongly agree).

*Anger:* Upon entering the experiment, participants were asked to indicate how much *anger* they felt. A week after the training, participants were asked to indicate how much *anger* and *rage* they felt ( $\alpha = .80$ ).<sup>6</sup> Five months later, participants were asked how much *anger* they felt. All ratings were done on a 1 (= not at all) to 6 (= very much) scale.

### Procedure

As reported in Halperin et al. (2013), the study included three sessions. In the first session, participants completed demographic information and other unrelated scales, and then they indicated their incremental beliefs about emotion and their baseline anger experience. Then, they were randomly assigned to either a reappraisal or a control condition. Participants in the reappraisal condition were trained in using cognitive reappraisal, following the procedure described in Richards and Gross (2000). The trainer made sure the participants were implementing cognitive reappraisal properly. Participants were then instructed to use cognitive reappraisal in their daily life during the upcoming week, in response to negative events. A week after the training and two days after the Palestinian bid to the United Nations, participants were contacted and reported their emotional reactions to the Palestinian bid. Five months later, participants were approached by a different experimenter and asked to rate their anger toward Palestinians.

## Results

The experimenters indicated that participants were able to effectively implement reappraisal following training ( $M = 4.11$ ;  $SD = 1.12$ , where 1 = not at all; 5 = very much). Means, standard deviations, and simple correlations between the key variables are presented in Table 1. We conducted a multiple regression analysis in which the experience of anger following training served as the outcome, and experimental condition (0 = control; 1 = reappraisal training), centred incremental theories of emotion, their interaction, and centred anger experience at baseline served as the predictors. There was no significant main effect for anger experience at baseline ( $B = 0.03$ ,  $SE = 0.20$ ,  $\beta = 0.02$ ,  $t = 0.14$ ,  $p = .888$ ), reappraisal training ( $B = -0.45$ ,  $SE = 0.30$ ,  $\beta = -0.19$ ,  $t = -1.51$ ,  $p = .138$ ), or incremental theories of emotion ( $B = 0.20$ ,  $SE = 0.18$ ,  $\beta = 0.17$ ,  $t = 1.14$ ,  $p = .261$ ). However, as expected there was a significant Belief  $\times$  Condition interaction,  $B = -0.88$ ,  $SE = 0.30$ ,  $\beta = -1.87$ ,  $t = -2.97$ ,  $p = .005$ .

To assess the simple effects and to draw Figure 2, we used Hayes (2013) PROCESS bootstrapping command (Model 1: 5000 iterations). As shown in Figure 2, in the reappraisal training condition, the more participants believed emotions are controllable the less angry they felt,  $B = -0.68$ ,  $SE = 0.24$ ,  $t = -2.85$ ,  $p = .006$ ,  $CI_{95\%} = [-1.16, -0.20]$ . In contrast, in the

control condition, incremental theories of emotion were unrelated to anger experience,  $B = 0.20$ ,  $SE = 0.18$ ,  $t = 1.14$ ,  $p = .261$ ,  $CI_{95\%} = [-0.15, 0.55]$ .<sup>7,8</sup>

### Anger five months after reappraisal training

We conducted a multiple regression analysis in which the experience of anger following training served as the outcome, and experimental condition (0 = control; 1 = reappraisal training), centred incremental theories of emotion, their interaction, and centred anger experience at baseline served as the predictors. There was no significant main effect for anger experience at baseline ( $B = -0.16$ ,  $SE = 0.17$ ,  $\beta = -0.13$ ,  $t = -0.93$ ,  $p = .360$ ), or incremental theories of emotion ( $B = 0.13$ ,  $SE = 0.16$ ,  $\beta = 0.14$ ,  $t = 0.81$ ,  $p = .423$ ). There was a significant main effect for reappraisal training,  $B = -0.56$ ,  $SE = 0.27$ ,  $\beta = -0.28$ ,  $t = -2.06$ ,  $p = .046$ . Finally, there was a significant Belief $\times$ Condition interaction,  $B = -0.65$ ,  $SE = 0.27$ ,  $\beta = -0.41$ ,  $t = -2.41$ ,  $p = .020$ .

In order to assess simple effects and to draw Figure 3, we used Hayes (2013) PROCESS bootstrapping command (Model 1: 5000 iterations). As shown in Figure 3, in the reappraisal training condition, the more participants believed emotions are controllable the less angry they felt,  $B = -0.52$ ,  $SE = 0.22$ ,  $t = -2.40$ ,  $p = .021$ ,  $CI_{95\%} = [-0.96, -0.08]$ . In contrast, in the control condition, incremental theories of emotion were unrelated to anger experience,  $B = 0.13$ ,  $SE = 0.16$ ,  $t = 0.81$ ,  $p = .423$ ,  $CI_{95\%} = [-0.19, 0.45]$ .<sup>9</sup>

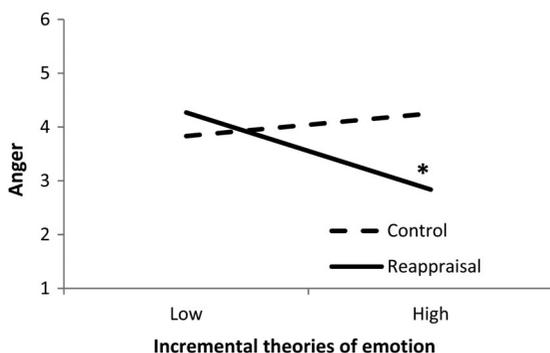
## Discussion

The findings of Study 2 provide causal evidence for the role of reappraisal in shaping emotion regulation

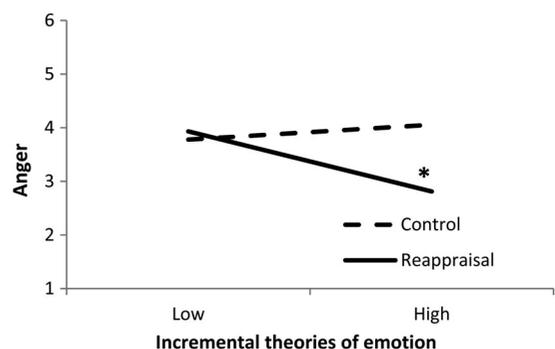
success, as a function of beliefs about the controllability of emotion. People with incremental beliefs about emotion were more effective in reducing their anger in response to an anger-inducing political event, only if they were trained in using reappraisal. Furthermore, the efficacy of the reappraisal training depended on the extent to which people endorsed incremental beliefs about emotion. People who were trained in using reappraisal subsequently felt less intense anger, the more they believed emotions can be controlled.

## General discussion

In this investigation, we proposed and provided initial evidence for the interactive effects of incremental beliefs about emotion and cognitive reappraisal on successful emotion regulation. In two studies, we demonstrated that people who were more successful in decreasing negative emotions, believed that emotions are more controllable, and were more likely to use cognitive reappraisal. This interactive effect was found when measuring stable individual differences in reappraisal and when training people to use reappraisal. It was found when participants regulated disgust or anger, in response to an emotion-inducing film, and real political events, respectively. Furthermore, it was found when people were regulating emotions in the laboratory and in their daily lives. Taken together, this evidence suggests that to successfully regulate emotions, people must believe that emotions can be controlled and have the proper means to do so, and that neither is sufficient in and of itself.



**Figure 2.** Anger experience following regulation, as a function of incremental theories of emotion (means in the high and low groups are estimated based on  $\pm 1$  SD from the mean) and condition (i.e. reappraisal vs. control training) a week after training (Study 2).



**Figure 3.** Anger experience following regulation, as a function of incremental theories of emotion (means in the high and low groups are estimated based on  $\pm 1$  SD from the mean) and condition (i.e. reappraisal vs. control training) five months after training (Study 2).

### **Theoretical implications**

The belief that emotions are more amenable to control is linked to more adaptive emotional outcomes (e.g. Tamir et al., 2007). We propose that cognitive reappraisal moderates the link between incremental beliefs about emotion and emotion regulation success. People who believe that emotions are more controllable may have greater conviction when regulating their emotions and such persistence is most likely to promote successful emotion regulation when it is combined with effective regulation tools. In this investigation, we provided initial support for the latter moderation model, showing that both incremental beliefs about emotion and cognitive reappraisal interactively promote successful emotion regulation.

This investigation offers a novel account of the joint operation of incremental beliefs about emotion and cognitive reappraisal. According to an alternative model that has been considered in the literature, cognitive reappraisal mediates the link between incremental beliefs about emotion and successful emotion regulation. According to this account, people who believe that emotions are controllable may be more likely than others to try to regulate their emotions, increasing the probability of using cognitive reappraisal. The increased use of cognitive reappraisal, in turn, is what actually promotes effective emotion regulation. This implies that incremental beliefs about emotion promote effective emotion regulation only to the extent that they lead people to use more effective regulation strategies, such as cognitive reappraisal. Consistent with this prediction, De Castella et al. (2013) recently found that incremental beliefs about emotion were related to greater well-being and lower psychological distress, and that this link was mediated by the frequency of cognitive reappraisal.

Although further research is required to examine these two theoretical accounts, it is possible that both are valid, as they might explain different phenomena. For instance, perhaps cognitive reappraisal mediates the link between incremental beliefs about emotion and general affective outcomes, but it moderates the link between incremental beliefs and emotions and the successful regulation of specific emotional responses. Indeed, in Study 2, we found support for a moderation model when examining the regulation of anger in response to a specific political event, but less conclusive support for a moderation model when examining the spontaneous experience of anger five months later. The designs of the current studies did

not allow us to test the mediation model in a reliable manner. Future research, therefore, should systematically examine when and why cognitive reappraisal moderates or mediates the link between incremental beliefs about emotion and emotional experiences.

Our conceptual model focused on beliefs about the controllability of emotion. We expected such beliefs to lead to successful emotion regulation when people use reappraisal, but not otherwise, and found support for this prediction. However, according to an alternative moderation model, beliefs about the controllability of emotion moderate the effect of reappraisal. Our findings shed some light on this alternative model. In both our studies, reappraisal had no effect on emotional experience among people who believed emotions were less controllable. These findings suggest that the effect of reappraisal may depend on the extent to which people believe emotions are malleable. On average, people tend to believe that emotions can be controlled (Tamir et al., 2007), and so it is not surprising that researchers typically find main effects of reappraisal. Our findings show that reappraisal is indeed effective in attenuating negative emotions, but suggests that such effects may depend on beliefs about the controllability of emotions. To test this alternative moderation model, future research should simultaneously manipulate both reappraisal and beliefs about the controllability of emotions. Doing so would also be important for establishing the independent effects of these two constructs.

Our findings may also carry applied implications. If successful emotion regulation requires both incremental beliefs about emotion and cognitive reappraisal, it may be necessary to cultivate both to promote regulation success. In this respect, our findings show that the efficacy of incremental beliefs about emotion depend on whether people use effective strategies, such as cognitive reappraisal.

### **Limitations and future research**

In the current investigation, we measured existing individual differences in incremental beliefs about emotion, and either measured or manipulated cognitive reappraisal. However, to test the roles of both reappraisal and beliefs about the controllability of emotion, it would be necessary to manipulate both. To the extent that we could lead people to adopt less incremental beliefs about emotion, would that render the use of cognitive reappraisal less successful?

Another related question is why people who use cognitive reappraisal vary in their belief that emotions can be controlled. One possibility is that success in emotion regulation leads people to cultivate incremental beliefs about emotion. People who use cognitive reappraisal effectively also believe emotions can be changed, whereas those who use it ineffectively believe emotions are less amenable to control. Another possibility is that similar to the way people study either to enhance performance or to enhance mastery (Blackwell et al., 2007), people may also reappraise in different ways. Future studies can examine these and related questions.

We proposed that incremental beliefs about emotion would promote emotion regulation if people use effective regulation strategies, such as cognitive reappraisal. An important question is whether incremental beliefs about emotion could impair emotion regulation if people use ineffective regulation strategies. In Study 1, we assessed trait rumination and found that it did not significantly moderate the effect of incremental beliefs about emotion on regulation success. Future studies should continue to test whether beliefs about emotion could impair the regulation of emotion, when people use less effective regulation strategies.

Finally, it would be important in the future to test the implications of the current findings to clinical populations, who exhibit dysfunctional patterns of emotion regulation. For instance, depression has been related to entity theories of emotion (Tamir et al., 2007). There is also some evidence that depressed individuals are able to implement cognitive reappraisal upon instruction (Dillon & Pizzagalli, 2013), but fail to use reappraisal in their daily life (D'Avanzato, Joormann, Siemer, & Gotlib, 2013). Our findings suggest that to improve emotion regulation in depressed individuals, it may be necessary not only to train people in using reappraisal, but also to cultivate a belief that emotions can be changed.

## Notes

1. The desired sample sizes in both studies were determined based on published recommendations. In particular, several sources recommended a sample size of at least 50 to test regressions with two independent variables (Harris, 1985; Van Voorhis & Morgan, 2007). Similarly, Kleinbaum, Kupper, Muller, and Nizam (1988) argued that to conduct a multiple regression, a sample size is needed that is at least 10 times larger than the number of independent predictors. Therefore, we opted for a sample size of 50. To account for possible attrition, we increased that sample size by 10% in Study 1, and by 20% in Study 2 (due to its longitudinal nature).

2. The reliability increased to .76 when we removed "unpleasant" from the aggregate, and the results of the target analysis did not change.
3. Participants also completed several unrelated questionnaires, including tasks that assessed reading and cognitive skills.
4. Similarly, people who endorsed more incremental beliefs about emotion felt less disgust the more frequently they used cognitive reappraisal,  $B = -0.88$ ,  $SE = 0.35$ ,  $t = -2.48$ ,  $p = .017$ ,  $CI_{95\%} = [-1.59, -0.17]$ . In contrast, people who endorsed less incremental beliefs about emotion did not differ in their disgust experience as a function of cognitive reappraisal,  $B = 0.35$ ,  $SE = 0.37$ ,  $t = 0.94$ ,  $p = .350$ ,  $CI_{95\%} = [-0.40, 1.10]$ .
5. Incremental beliefs about emotion and cognitive reappraisal were positively correlated ( $r = .42$ ,  $p = .001$ ). Therefore, we also tested a mediation model. Using Hayes' (2013) PROCESS bootstrapping command (Model 4: 5000 iterations), we found no significant indirect effect of incremental beliefs about emotion on regulation success through cognitive reappraisal,  $B = -0.15$ ,  $BC\ CI = [-0.50, 0.23]$ . Moreover, there was no direct link between incremental beliefs about emotion ( $r = -.17$ ,  $p = .231$ ) nor between cognitive reappraisal ( $r = -.20$ ,  $p = .162$ ) and the experience of disgust.
6. Halperin et al. (2013) assessed both negative emotions (i.e. anger and rage) and positive emotions (i.e. empathy and hope). However, because participants were trained to use reappraisal to decrease anger, in particular, we focused on the efficacy with which anger was regulated.
7. Similarly, among people with more incremental beliefs about emotion, reappraisal training was related to less anger compared to people in the control group,  $B = -1.42$ ,  $SE = 0.43$ ,  $t = -3.32$ ,  $p = .002$ ,  $CI_{95\%} = [-2.27, -0.56]$ . In contrast, among people with less incremental beliefs about emotion, reappraisal training was unrelated to successful anger regulation,  $B = 0.44$ ,  $SE = 0.43$ ,  $t = 1.01$ ,  $p = .319$ ,  $CI_{95\%} = [-0.43, 1.31]$ .
8. To test whether this effect was driven by individual differences in the ability to implement reappraisal, we repeated the analyses above with the experimenters' ratings of participants' ability to implement reappraisal as an additional covariate. The two-way interaction remained significant when controlling for the ability to implement reappraisal technique at both time points. The three-way interaction was not significant,  $t < 1.30$ .
9. Similarly, among people with more incremental beliefs about emotion, reappraisal training was related to less anger compared to people in the control group,  $B = -1.25$ ,  $SE = 0.40$ ,  $t = -3.13$ ,  $p = .003$ ,  $CI_{95\%} = [-2.05, -0.44]$ . In contrast, among people with less incremental beliefs about emotion, reappraisal training was unrelated to successful anger regulation,  $B = 0.15$ ,  $SE = 0.40$ ,  $t = 0.38$ ,  $p = .705$ ,  $CI_{95\%} = [-0.65, 0.96]$ .

## Disclosure statement

No potential conflict of interest was reported by the authors.

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