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The Effectiveness of Emotion Regulation
Interventions on Positive and Negative Emotions:
A Systematic Review

Sanne van der Zwet BSc

Master Thesis – Developmental Psychology

S3636925
December 2023
Department of Psychology
University of Groningen
Examiner/Daily supervisor:
prof. dr. Peter de Jonge

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Abstract

Emotion regulation interventions could be beneficial for treating a multitude of symptoms e.g. anxiety and depression. A systematic review was performed to assess the effectiveness of emotion regulation interventions for increasing and prolonging positive emotions, and for decreasing negative emotions. Thirteen RCTs were assessed and combined to measure a pooled effect size. The found effect sizes show a small to moderate effect size for the emotion regulation interventions. Emotion regulation interventions seem effective for increasing and prolonging positive emotions, and for decreasing negative emotions. More research is necessary to gain better understanding of the application of ERT as a cognitive intervention tool, and of non-cognitive approaches to ERT.

The Effectiveness of Emotion Regulation Interventions on Positive and Negative Emotions: A Systematic Review

Introduction

We use emotion regulation on a daily occurrence, often without realising we do so. We go for a walk, take some deep breaths, and talk about our troubles with the people closest to us. The strategies we use are taught to us from as early as infancy. Babies learn, through interactions with their environment, how to self-soothe (Atkinson et al., 2021), and when children first start going to school, they are met with new opportunities for socialisation and developing new emotion regulation strategies (Sala et al., 2014). In adolescence a new emphasis is placed on cognitive reappraisal and emotional flexibility (Fombouchet et al., 2023). These emotion regulation strategies help us better navigate our emotional states and daily functioning. In general, these emotion regulation strategies are enough to cope with everyday stressors (Gross, 2015). However, when these automatic processes are lacking, a variety of emotional difficulties can occur, leading to psychological symptoms e.g. anxiety and depression, and a general feeling of unease. The current study examines the effectiveness of emotion regulation interventions that aim to teach emotion regulation skills.

Cognitive behavioural therapies (CBT) is the most common and well-researched intervention that is used for treating anxiety and depression symptoms. However, there is a lot of debate about its effectiveness, especially when taking into account the amount of relapse, which, according to Lorimer et al. (2020), is around 23.8%. Thus, the effectiveness of CBT could be improved. One proposed method is to add emotion regulation treatment (ERT) to the regular CBT program to enhance emotion regulation skills, which in turn improves overall emotional wellbeing and daily functioning (Emmelkamp et al., 2022). Therefore it is necessary to study the effectiveness of emotion regulation interventions.

Research on emotion regulation has increased since the 1990s (Gross, 2015). This research field is highly relevant, because emotion regulation is a valuable skill that is used on a daily basis. Research can help understand what emotions and their regulations entail, how it can be applied, and how it works. Recent research aimed to test the effectiveness of emotion regulation interventions on increasing positive emotions e.g. resilience and on decreasing negative emotions e.g. anxiety. This systematic review aims to combine the results of previous research, to contribute to the growing amount of knowledge about emotion regulation.

Gross (2015) proposed the process model of emotion, that states that emotions are part of affect, along side stress responses and moods. Emotions are specific and situation-bound, whereas stress responses are non-specific and situation-bound, and moods are non-specific and not situation-bound. Gross (2015) described affect regulation that is specific to each of these types of affect, namely coping with stress responses, emotion regulation for emotions, and mood regulation for moods. Gross (2015) describes emotion regulation as anything a person can do to manage their emotions and the way in which these emotions manifest themselves. The process model of emotion depicts emotion

regulation as a dynamic cycle, that consists of a situation, that elicits attention, after which the situation is weighted and receives a value (Gross, 2015). This is called cognitive appraisal, which in turn is followed by a response. Emotion regulation interventions can be applied to any of the steps of the process model. However, most research focuses on managing cognitive reappraisal. This refers to giving a new value to the situation, thereby eliciting a new, more adequate response to the situation.

When discussing emotion regulation, it is often assumed to have the goal of decreasing negative emotions. However, according to Tugade and Fredrickson (2007), emotion regulation can be used to strengthen or prolong positive emotions. A prolonged positive feeling is beneficial for an overall sense of well-being and happiness. A common emotion regulation strategy that illustrates this is called savouring. Savouring means to consciously notice the happiness one feels at a specific time. This is often done by sharing their reasons for this happiness with the people around them, for example when sharing good news. These strategies for positive emotion regulation can function as a buffer for dealing with stressful events, when the positive emotions are not as prominently active. This is called resilience and is highly beneficial for daily functioning. In addition, Emmelkamp et al. (2022) noted an association between competent emotion regulation and a decrease in a multitude of symptoms, e.g. anxiety and depression symptoms, stating that by training ones emotion regulation skills, one could improve their mental health.

Literature adheres to a distinction between emotion regulation to increase positive emotions and to decrease negative emotions. Thus, this systematic review aims to answer two research questions:

1. Are emotion regulation interventions effective in increasing and prolonging positive emotions?
2. Are emotion regulation interventions effective in decreasing negative emotions?

In this review the terms positive and negative emotions are used. While in everyday life negative emotions can be appropriate to better deal with certain situations, in this study negative emotions are seen as unhelpful or not fitting to the situation, for example prolonged feelings of depression or anxiety. Positive emotions are seen as helpful emotions.

Method

The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines (Page et al., 2021) were taken into account when writing this systematic review. The databases that were used are PsycInfo and Smartcat. The articles were collected by the author until 8 June 2023.

Inclusion criteria

The inclusion criteria for the selected articles were: the articles were published in English, an emotion regulation intervention was used, the studies were RCT's, emotion regulation was in the title, the studies were not protocol studies or policy guidelines, and participants were at least eighteen years old.

Search procedure

The electronic databases PsychINFO and Smartcat were used to collect the articles for this study. To collect the data, the following keywords were used: emotion regulation AND rct OR randomized control trial OR randomized controlled trial NOT protocols OR guidelines OR procedures OR policy.

Research shows a difference in emotion regulation in adults versus children and babies, the latter were filtered from the sample.

Pilot studies and protocol guidelines were also excluded from the sample, since the aim of those particular articles was not to test the effectiveness of emotion regulation interventions and therefore did not correspond to the research question of this review.

Aa filter for clinical trials was used to ensure the quality of the selected studies. The data collection was done by the author and is shown in Figure 1.

The initial search led to 121 results. After filtering for clinical trials, 36 results remained. Based on the titles and abstracts, 17 articles were deemed unfit for this study, based on the previously set inclusion criteria. After analysing the remaining 19 articles, three articles were removed from the dataset, because they were protocol studies, and another three articles were removed, because they were trial studies. In the end 13 articles were deemed fit for the review, adhering to the inclusion criteria.

Results

Descriptive characteristics

As shown in Figure 1, thirteen articles were selected for review. Four articles focused on the enhancement of positive emotions, mainly by focusing on resilience. Twelve articles focused on decreasing negative emotions, e.g. symptoms of depression and anxiety. Three articles (Jazaieri, et al., 2014; Zhang et al., 2022; Pogrebtsov et al., 2022) were analysed in both the positive emotions group and negative emotions group (see Table 1 and Table 2). One of the thirteen articles had an active control group, while others had routine care or waitlist control groups.

Figure 1

Flow Diagram of the Systematic Review

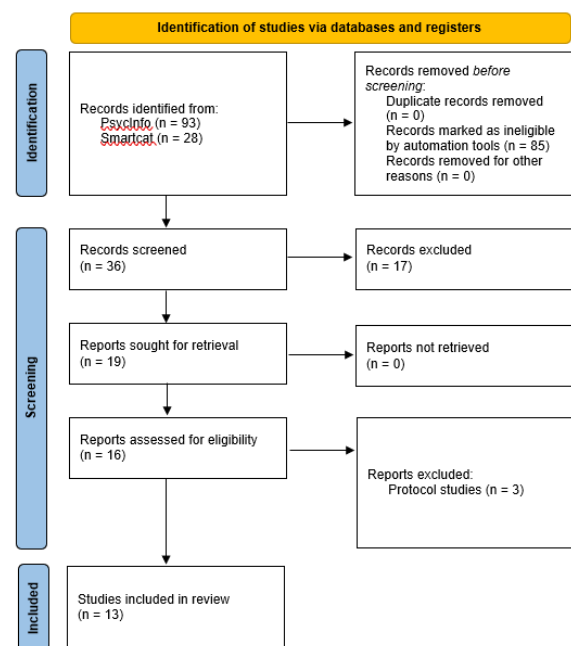


Table 1*Descriptive Characteristics*

First Author	Sample Size	Population	Positive / Negative	Effective
Behrouian	70	caregivers	positive	yes
Zhang	72	college students	positive	yes
			negative	yes
Jazaieri	100	adults from the community	positive	yes
			negative	yes
Progrebtsova	119	students	positive	yes
			negative	yes
Berking (2013)	432	MDD patients	negative	yes
Berking (2022)	101	BED patients	negative	yes
Eckert	83	general population	negative	yes
Schuenemann	148	students	negative	yes
Wierenga	30	cardiac patients	negative	no
Gratz	61	female BPD patients	negative	yes
Mennin	45	GAD and GAD/MDD patients	negative	yes
Preuss	217	parents	negative	yes
Bjureberg	234	people with high anger scores	negative	yes

Note. See Appendix A for a complete overview

Table 2*Descriptive Statistics*

First Author	Positive/negative	Effective	Affect	P-value	Cohen's d
Behrouian	positive	yes	resilience	<.001	no reported effect size
Zhang	positive	yes	resilience	<.01	no reported effect size
	negative	yes	negative affect	<.001	no reported effect size
Jazaieri	positive	yes	happiness	<.05	.1*
	negative	yes	worry	<.02	.14*
Progrebtsova	positive	yes	positive affect	<.05	.11
	negative	yes	perceived stress	<.001	.06
	negative	yes	negative affect	<.001	.07
Berking (2013)	negative	yes	depression	.03	.16
	negative	yes	negative affect	<.05	0,2
Berking (2022)	negative	yes	depression	.01	.49
Eckert	negative	yes	procrastination	<.01	.34
	negative	yes	procrastination	<.001	.59
Schuenemann	negative	yes	procrastination	<.001	.55
Wierenga	negative	no	depression	.25	.28*
	negative	no	anxiety	.15	.38*
Gratz	negative	yes	BPD symptoms	<.05	-1.20
	negative	yes	depression	<.05	-.51

	negative	yes	stress	<.05	-.60
Mennin	negative	yes	GAD and MDD symptoms	<.001, <.001, <.001	.83*, .93*, 1.50*
Preuss	negative	yes	individual stress	<.001, <.001	.68, .48
	negative	yes	parental stress	<.003	.49
Bjureberg	negative	yes	anger expression	<.028	.27

Note. The effect sizes with * were converted to Cohen's d . The pooled effect size for the positive emotions is $d = .11$. The pooled effect size for the negative emotions is $d = .29$. See Appendix A for a complete overview

Results for increasing positive emotions

Behrouian et al. (2021) studied the effectiveness of emotion regulation training on caregivers of patients with schizophrenia. They randomly assigned seventy participants to either a control group that received routine care, or an intervention group that participated in eight weekly 90-minute sessions of an emotion regulation intervention. Resilience was tested before and one month after the intervention, using the Conner-Davidson resilience scale. The study reported a significant increase in resilience score in the intervention group ($p < .001$). The resilience score at baseline was significantly higher for the control group than in the intervention group. After the intervention, there were no significant differences between the two groups. There was no reported effect size. Behrouian et al. (2021) concluded that emotion regulation interventions that are based on cognitive and metacognitive skills, can increase participants resilience and well-being.

Zhang et al. (2022) studied the effects of a mindfulness-based emotion management intervention on emotion regulation and resilience. 72 college students were randomly assigned to either the intervention group or a control group. The intervention group followed four weekly eighty-minute sessions in which they learned skills that are based on attention-acceptance theory, while the control group lived their lives as usual. The mindfulness, emotion and resilience levels of the students were measured before and six months after the intervention. The results show a significant interaction effect for mindfulness ($p < .01$), mood ($p < .01$), and resilience ($p < .01$), leading to the researchers conclusion that a mindfulness-based four week emotion regulation program improves mindfulness and resilience of college students. There was no effect size reported.

Similarly, Jazaieri et al. (2013) tested the effects of compassion cultivation training on mindfulness, positive affect, and emotion regulation. Fifty participants were allocated to and completed the CCT intervention, while thirty participants were allocated to a waitlist condition. The intervention took place over the course of nine weeks, after which participants completed self-report inventories. Results showed a significant increase in mindfulness ($p < .001$) and happiness ($p < .05$) for the intervention group, compared to the control group, with a small effect size ($d = .1$). Jazaieri et al. (2013) concluded that compassion cultivation training effects mindfulness and affect, thereby increasing psychological flexibility and adaptive functioning, which promotes constructive emotion regulation.

While previously discussed studies were conducted with a waitlist or treatment as usual control group, Progrebtsova et al. (2022) studied the effectiveness of an emotion regulation intervention on daily well-being and cognitive reappraisal, compared to an active control group. 119 students were randomly assigned to either the well-being toolkit intervention group, the active well-being toolkit control group, or the cognitive toolkit control group. The groups followed one week of training and baseline surveys, followed by two weeks of intervention and two weeks of postintervention surveys. All conditions showed improvement on daily well-being and cognitive reappraisal. However, the intervention group showed a bigger improvement on cognitive reappraisal ($p < .01$) and positive affect ($p < .05$), with a moderate effect size for cognitive reappraisal ($d = .2$) and a small effect size for positive affect ($d = .11$). This leads the researchers to conclude that self-practiced activities that stimulate cognitive reappraisal, mindfulness, and savouring can improve cognitive reappraisal and emotion regulation, since this is the common factor across all conditions.

Effectiveness of emotion regulation training on positive emotions. *Are emotion regulation interventions effective in increasing and prolonging positive emotions?*

The discussed studies all reported a significant effect with the conclusion that emotion regulation training is effective in prolonging and strengthening positive emotions and resilience. However, only two studies reported an effect size. Progrebtsova et al. (2022) reported a small effect size ($d = .11$) for the effect of ERT on positive affect, and Jazaieri et al. (2013) reported a small effect size ($\eta^2 = .05$) for the effect of ERT on happiness. After converting the partial eta squared to Cohen's d , the weighted average of both effect sizes is $d = .11$. This small effect size implicates a limited practical application.

Results for decreasing negative emotions

Berking et al. (2013) studied the effect of adding emotion regulation skills training to cognitive behavioural therapy for major depressive disorder patients. 432 participants were randomly assigned to an intervention group or a control group. In the intervention group, participants followed a CBT-program with an extra added emotion regulation training. The control condition followed treatment as usual, which consisted of routine CBT-care. The study reported a significant reduction in depression ($p = .03$) and negative affect ($p < .05$). Researchers concluded that adding emotion regulation skills training to regular CBT, enhances its efficacy for MDD patients.

Berking et al. (2022) conducted a similar study, where they tested a transdiagnostic emotion regulation skills training on binge eating disorder patients. Participants were divided in an emotion regulation intervention group and a waitlist control group. The results were measured before and in a six month period after the intervention. While the emotion regulation skills showed a significant increase ($p < .001$), the amount of binges was significantly decreased for patients in the intervention condition, as well as depression ($F(1, 97) = 7.19, p = .005$); ($F(1, 97) = 5.43, p = .01$). Berking et al. (2022) concluded that there is an association between following an emotion regulation skills training and a decrease in the amount of binges and feelings of depression.

Eckert et al. (2016) conducted three studies in which they tested the effects of an emotion regulation training on procrastination, with the aim to reduce and prevent procrastination. In their final study, which consisted of an RCT, fifty-seven participants were randomly assigned to the intervention group or a waitlist control group. The intervention group participated in a training that focused on emotion focused strategies that were said to help overcome procrastination. The data was collected pre and post intervention. Researchers reported a significant decrease in procrastination between groups ($F[1,81] = 8.979, p < 0.01$) and within ($t = 5.113, p < 0.001$) the intervention group, with participants reporting to be better able to tolerate aversive emotions. Eckert et al. (2016) concluded that the online emotion regulation training is an effective tool for decreasing procrastination.

Similarly, Schuenemann et al. (2022) studied the effect of an emotion regulation intervention on procrastination. 148 students were randomly selected for either the intervention group, that followed an online emotion regulation training over the course of nine weeks, or a waitlist control group. Assessment took place before and after the intervention period. The researchers reported a significant effect of the emotion regulation intervention on procrastination ($p < .001$) with a moderate effect size ($d = .55$), concluding that this intervention method is effective against procrastination.

Wierenga et al. (2021) showed that emotion regulation interventions are effective in decreasing depression and anxiety symptoms in cardiac patients, thereby enhancing cardiac rehabilitation. They studied this by randomly assigning thirty participants to a phone-based attention control group or an intervention group that took part in five one-hour group sessions of the theoretically based RENEwS intervention. The RENEwS group showed no significant difference in depression ($p = .25$) and anxiety symptoms ($p = .15$), compared to the control group. The researchers stated that even though there were no significant results, there was still a reduction of depression and anxiety symptoms, leading to the conclusion that the RENEwS seems to be a fitting intervention to enhance cardiac rehabilitation.

Gratz et al. (2012) studied the effects of emotion regulation therapy on patients with borderline personality disorder with self-harm tendencies. They randomly assigned 61 participants to follow an emotion regulation therapy intervention or treatment as usual, consisting of individual or group sessions with their clinician, who was not part of the study. The study took place over the course of fourteen weeks, after which followed a nine month follow-up, with measurements taken at three and nine months. Researchers measured a significant decrease in deliberate self-harm and other self-destructive behaviour ($p < .05, d = -.64$), emotion dysregulation ($p < .05, d = -.55$), BPD symptoms ($p < .05, d = -1.20$), depression ($p < .05, d < -.51$) and stress ($p < .05, d = -.60$), and a significant increase in quality of life, resulting in the conclusion that emotion regulation therapy is effective in decreasing these symptoms.

Mennin et al. (2018) studied the effects of emotion regulation therapy on anxiety disorder with and without co-occurring depression. 53 patients with anxiety disorder, of which 43% had co-occurring diagnosed depression, were randomly assigned to follow emotion regulation treatment or a

modified attention control condition. Researchers measured the levels of anxiety disorder symptoms ($p < .001, d = .83$) ($p < .001, d = 1.50$), depression symptoms ($p < .001, d = .93$), rumination, functional impairment, emotion regulation, and quality of life before, during, and immediately after the intervention period, followed by a three and nine month follow-up. There was a significant effect for all variables with large effect sizes, leading Mennin et al. (2018) to conclude that emotion regulation therapy is an effective treatment for anxiety disorder, and anxiety disorder combined with depression.

Preuss et al. (2021) studied the effectiveness of self-compassion and cognitive reappraisal on stress during the corona pandemic. They recruited 265 parents who were randomly assigned to either a cognitive reappraisal intervention group, a self-compassion intervention group, or a waitlist control group. Assessment took place before, during and seven days after the intervention period, which lasted a week. Researchers reported a significant decrease in individual stress ($t(273)=6.27, p < .001, d = .68$), ($t(273)=4.22, p < .001, d = .48$) and parental stress ($p < .003, d < .49$), and negative affect ($t(136) = 4.15, p < .001$), SC ($t(136) = 3.64, p < .001, d = 0.43$), ($F(2, 136) = 3.25, p = .042$), ($F(2,136) = 3.86, p = .023$), concluding that short-term interventions that focus on cognitive reappraisal and self-compassion can help in decreasing acute stress symptoms.

Bjureberg et al. (2023) studied the effects of online emotion regulation treatment on maladaptive anger. 234 participants with maladaptive anger were randomly assigned to three treatment groups: mindful emotion awareness, cognitive reappraisal, or mindful emotion awareness and cognitive reappraisal. Assessment took place before, during, immediately after, and three months after the treatment period. The combined treatment showed a significant decrease in anger expression ($p < .028, d = .27$), aggression, and anger rumination, while the individual treatment groups showed no significant effects. This leads researchers to conclude that while mindfulness and cognitive reappraisal are effective in learning emotion regulation skills, the preference goes to a combination of the two.

As mentioned earlier, Progrebtsova et al. (2022) studied the effectiveness of an emotion regulation intervention on daily well-being and cognitive reappraisal, compared to an active control group. Besides cognitive reappraisal and positive affect, they also looked at negative affect ($t(1,013) = -8.17, p < .001, d = .07$) ($t(1,011) = 0.59, p = .56$) and perceived stress ($t(1,013) = -7.58, p < .001, d = .06$) ($t(1,011) = -0.32, p = 0.75$). Both variables showed a significant effect for the pre-post intervention analysis, but no significant effect when compared to the active control group. However, researchers remarked that the intervention group showed a sharper growth when compared to both control groups, therefore concluding that this emotion regulation intervention is preferred.

In a similar vein Jazaieri et al. (2013) tested the effects of compassion cultivation training on mindfulness, positive affect, and emotion regulation. Besides studying participants' happiness scale, they also studied their worry and perceived stress levels. While there was a significant decrease in worry ($p < .02, d = .14$), the perceived stress scores showed no significant difference ($p > .91$). Researchers concluded that the intervention training has an effect on emotional states.

Lastly, Zhang et al. (2022) studied the effects of a mindfulness-based emotion management intervention on emotion regulation and resilience. The negative emotions that were analysed were nervousness, anger, fatigue, depression, vitality, panic, and self-esteem. There was a significant effect on all scales ($p < .001$). Therefore researchers concluded that the emotion regulation intervention can help to improve students mental health.

Effectiveness of emotion regulation training on negative emotions. *Are emotion regulation interventions effective in decreasing negative emotions?*

The marked effect sizes in Table 1 were used to assess the overall effectiveness of the applied emotion regulation practices. These were the effect sizes of variables that were deemed suitable in measuring negative emotions. Rumination in Mennin's article for example, is not seen as an emotion but behaviour, while depression symptoms were seen as both behavioural and emotional. These selected effect sizes were converted to Cohen's d when necessary and pooled and resulted in a medium overall effect size ($d = .29$). This means that there is a moderate practical application.

Discussion

The current study aimed to assess the effectiveness of emotion regulation training for prolonging and strengthening positive emotions, and for decreasing negative emotions, taking inspiration from the PRISMA guidelines (Page et al., 2021). A total of thirteen articles was reviewed and combined to answer the following research questions:

1. Are emotion regulation interventions effective in increasing and prolonging positive emotions?
2. Are emotion regulation interventions effective in decreasing negative emotions?

The current study has found that emotion regulation training is effective for increasing and prolonging positive emotions, and decreasing negative emotions. Almost all analysed studies showed a significant effect, apart from Wierenga et al. (2021), which they prescribe to a small study design. The positive data group showed a small pooled effect size ($d = .11$) and the negative data group showed a moderate pooled effect size ($d = .29$). This means that the found effects likely have a limited practical application, meaning that there is no certainty of the found effects holding up outside the research environment.

ERT only showed a small effect size for increasing and prolonging positive emotions. This can be explained by the lack of provided effect sizes. Two out of four studies provided an effect size, which was small in both cases. This lack of information might have skewed the pooled effect size.

ERT showed a moderate effect size for decreasing negative emotions. All but one studies reported a significant effect. Most studies reported a small to medium effect size, and when pooled there was a moderate effect size, meaning there is moderate practical application. It should be noted that, although not as worrisome as in the positive data pool, not all studies reported an effect size in their statistical analysis. It is unknown what implication this has on the results of this current study.

Thus, emotion regulation interventions seem to significantly strengthen and prolong positive emotions, by which these emotions can form a buffer to better cope with stressful events (Tugade and Fredrickson, 2007). It also seems to significantly decrease negative emotions, which provides support for recovery of depression and anxiety symptoms, and prolonged stress (Gross, 2015). The current analysis touched on a bigger picture of the way we look at emotion regulation. Emotion regulation is often approached as goal-oriented, when in fact, this is not the aim of Gross' process model of emotion regulation (2015). Emotion regulation is by definition not goal-driven, but rather a never-ending process. One could argue that instead of working towards a goal, e.g. becoming happier, the function of emotion regulation is simply to gain emotional states that are functional to the situation and show more stability over time. All emotions have their own function, but learning to regulate or control them can be helpful in reacting adequately in challenging situations, thereby showing less fluctuations over time. For those who struggle with emotion regulation, a fitting intervention could help optimize this process, thereby lessening their burden.

Limitations

A limitation to this study is the lack of reported effect sizes in the RCTs. It is uncertain how this has influenced the outcome of this study. The basic statistical analysis that is performed in this study only scratches the surface. However, the aim of this study was to show a summary of what the current research field looks like, which is helpful in pointing out areas of research that need to be highlighted more. It is therefore recommended that in future RCTs the found effect sizes are reported, regardless of whether or not there is a significant effect.

ERT seems effective, but with a wide variety of interventions available and with only small to moderate effect sizes, it is unclear which ERT is the most effective. It is helpful to know which intervention is the most effective for which type of person and situation. Since there is no one size fits all solution, and considering the costs of creating and applying these intervention programs, it is essential to gain a better understanding of the effectiveness of specific interventions and the mechanisms behind it. This can be accomplished by taking inspiration from Progrebtsova et al. (2022), who used an active control group in their study design. Using an active control group creates a fair comparison between different interventions, that will illustrate which interventions are most effective, thereby giving more insight in these intervention programs.

Apart from this, it is notable that the analysed studies all opted for a cognitive focused intervention, but there are more approaches one can take. Aalbers et al. (2017) showed for example that music therapy is beneficial for treating depression and anxiety symptoms, when added to standard care. Music is known to affect emotional states and is commonly used to self-regulate. Many patients experience music therapy not just as beneficial to their mental health, but also as a social and pleasurable activity, which is beneficial for preventing dropout. Therefore, when discussing ways to improve emotion regulation treatment, it is necessary to research different types of cognitive and non-cognitive approaches in the future. By doing so, we could gain a better understanding of the

effectiveness of different kinds of emotion regulation and which interventions are best suited in different situations and for different people, thereby eliminating unnecessary health care costs and effectively and efficiently treating those in need of care.

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Appendix A

Table 3
Descriptive statistics and key findings of the reviewed studies

RCT	Participants		Intervention			Outcome	Measuring instruments	Results	Effect size
	N (M/F)	Characteristics	EG/CG	EG	CG				
Behrouian, M., [1]	70 (35/35)	caregivers of patients with schizophrenia	EG 35(46,68+-15,51), CG 35(45,34+-12,63)	emotion regulation training	routine care	8x90 min sessions, 1 session per week	Conner-Davidson resilience scale	between groups ($t=-2.56, p=0.01$), within ERT group ($Z=-5.41, p<0.001$)	no effect size reported
Berkling, M., [5]	432 (195/237)	MDD patients	EG 195(45.67+-8.62), CG 237(47.07+-9.00)	CBT-ERT	CBT	CG: 1x45 min individual therapy and 4x45 min group therapy per week for depression, 4x45 min group therapy problem-solving therapy, 6x45 min relaxation training, 4 sportsessions and 2 occupational therapy sessions per week; EG: 4x90 min and 2x45 min sessions during week 3 on 4 instead of 10x45 min routine CBT	BDI ERSQ PANAS	($t=-20.72; p<0.001$), ($t=1.98; p=0.03$) ERSQtotal ($t=-1.54; p=0.062$) ($t=-2.31; p<0.05$)	$d=0.16$ $d=0.12$ $d=0.20$
2013						depression ER skills negative affect well-being	impaired well-being subscale of		
Berkling, M., [6]	101 (14/87)	BED patients	EG 61(44.07+-11.90), CG 40(43.05+-12.81)	emotion regulation skills training	wait list control	eight weekly trainings, assessment within one week after, follow-up at 6 months	ERSQ	($t(558.72) = -5.86, p<.001$); ($F(1, 97) = 10.19, p<.001, d = 0.65$)	$d=0.65$
2022						depression	BDI-II	($F(1, 97) = 7.19, p = .005$); ($F(1, 97) = 5.43, p = .01$)	$d=0.49$

Table 3 Continued

Descriptive statistics and key findings of the reviewed studies

RCT	N (M/F)	Participants				Intervention			Measuring instruments	Results	Effect size
		Characteristics n (age + sd)	EG/CG	EG	CG	Duration and frequency	Outcome				
Bjureberg, J.,	[7]	234 (96/138) people in 70th percentile or higher on AXO	ME+CR:79 (40.6+-10.5) ME+CR	ME+CR, ME+CR		4 weeks baseline, 4x1 module per week, 3 month follow-up	anger expression	STAXI-2 AXO	p<0.028	d=0.27	
Eckert, M.,	[8]	83 (26/57) general population	83(40.8+-11.9)	IG	WLC	2 weeks, daily 10 minutes	procrastination	GPS short version	p<0.01, within t = 5.113, p<0.001	d=0.34, d=0.59	
Gratz, K. L.,	[10]	61 female outpatient BPD	EG:31(33.3+-11.0)/CG:30(33.0+-10.9)	ERGT+TA U	TAU waitlist	14 weeks, follow-up after 3-9 months	self-destructive behaviour	DSHI	p<0.05	d=-0.64	
Jazaieri, H.,	[2]	100 adults from the community	CCT:60(41.98+-11.48)/WL:40(44.68+-13.05)	CCT	WL	2h introduction orientation, 2h per week classes, 8 weeks, daily compassion focused meditation practices for 15-30 mins	emotion dysregulation BPD symptoms depressions and stress symptoms quality of life	DERS ZAN-BPD DASS-D, DASS-S SDS, QOLI	p<0.05 p<0.05 p<0.05, p<0.05 p<0.05, p<0.05	d=-0.55 d=-1.20 d=-0.51, d=0.60 d=-0.16, d=0.52	
Jazaieri, H.,	[2]	100 adults from the community	CCT:60(41.98+-11.48)/WL:40(44.68+-13.05)	CCT	WL	2h introduction orientation, 2h per week classes, 8 weeks, daily compassion focused meditation practices for 15-30 mins	mindfulness	KIMS; Penn State Worry Questionnaire ; ERQ	F1,75 = 11.30, p<0.001	$\eta^2=0.13$, d=0.26	
							affect		worry $\eta^2 = 0.07$, happiness $\eta^2=0.05$, worry (F1,79 = 5.88, p<0.02), happiness (F1,73 = 3.99, p<0.05), perceived stress (p>0.91)	d=0.14, happiness d=0.1	

Table 3 Continued
Descriptive statistics and key findings of the reviewed studies

RCT	Participants		Intervention			Measuring instruments	Results	Effect size
	N (M/F)	Characteristics	EG/CG	EG	CG			
Zhang, J.	[3] 72	college students	EG: 36(19.14+-1.27), CG: 36(18.68+-1.30)	mindfulness-based management program	life as usual	1x per week 80 min, 4 weeks, follow-up na 6 maanden	mindfulness FFMQ	(F = 97.76, p < 0.01) reported no effect size reported
Mennin, D. S.,	[11] 45 (20/25)	patients with GAD or GAD/MDD comorbidity	45(39+-14.5)	ERT	MAC (non active control)	20 weekly sessions of 60min (sessions 11-16 were 90min), follow-up 3-9 months	GAD and 3-MDD symptoms rumination functional impairment GAD CSR, PSWQ, BDI RSQ brooding	Hedge's (z=-6.5, p<0.001), (z=-6.9, p<0.001), (z=-4.2, p<0.001) g ² -d=0.83, g ² -d=1.5, g ² -d=0.93 g ² -d=0.74
Preuss, H.,	[12] 217 (16/201)	parents of school-going children, aged 3-18 years	CR:73(41.15+-5.81), SC:75(41.09+-5.98); WLC:69(39.58+-6.80)	CR, SC	WLC	8 days, day 1 pretest, days 1-4 intervention, days 4-8 posttests	quality of life regulation PSS-10 parental stress PSQ	(z=-2.6, p=0.009) (z=2.2, p=0.031) CR(t(273)=6.27, p<0.001), SC(t(273)=4.22, p<0.001) t(246) ≥ 5.64, all ps ≤ .003

expressive suppression frequency (F1,75 = 8.38, p<0.005), expressive suppression self-efficacy interaction effect (F1,75 = 4.54, p<.04), no effect cognitive reappraisal self-efficacy frequency or self-efficacy (p>0.38)

emotion regulation

emotion

resilience

quality of life regulation

parental stress PSQ

