Anger and emotion regulation in interpersonal and intrapersonal contexts: a systematic review

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***Abstract*:** Anger regulation and the way people choose to regulate their anger can influence the intensity of emotion or one's behavior. In this systematic review, identifying 26 studies, we aimed to analyze the impact of several emotion regulation strategies on anger experience. The studies in this present research include interpersonal contexts (e.g., interaction with a participant) or intrapersonal contexts (trait anger or autobiographical recall). There are included studies that focus on implicit emotion regulation strategies, and at the same time, studies that manipulate emotion regulation strategies. All participants in the selected studies are adults. The results show that cognitive reappraisal is a healthy emotion regulation strategy and can decrease the intensity of anger. Another strategy that has the same effect on anger is distraction. Speaking of two other emotion regulation strategies: experiential avoidance and other-blame, evidence suggests that these strategies do not help in dealing with anger. A few studies approach venting as a strategy for regulating anger. The effects of expressive suppression and anger rumination are mixed. Our study emphasizes the need for additional laboratory-based studies and extend the research on different emotion regulation strategies.

Keywords: Anger, Emotion regulation, Cognitive reappraisal, Expressive suppression, Rumination, Venting, Other-blame, Distraction

Introduction

This present study provides systematized information about an important interpersonal and intrapersonal phenomenon: anger regulation. In their study, van Kleef and collaborators (2008), defined interpersonal anger as the effect of one person's display of anger on another individual and intrapersonal anger as the subjective feeling of anger. We started from these definitions and included studies presenting anger in two contexts: interpersonal, referring to an accomplice of the study inducing anger in the participants and intrapersonal, subjects recalling an event from their past when they felt angry. Anger can

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substantially impact a person's interpersonal relationships and well-being, leading, at its worst, to extreme negative behaviors directed towards others (e.g., interpersonal violence) or oneself (e.g., self-mutilation, suicide; Giegling et al., 2009; Novaco, 2011). Given its possible negative outcomes, regulating anger becomes critical. However, not all regulation strategies are as useful. Anger regulation can decrease the intensity of the emotion but, in some cases, can have a negative impact on one's emotional state (Memedovic et al., 2010; Southward et al., 2019). Thus, even if people feel intense anger, the way they regulate their emotion influences its consequences.

One important limitation of the existing literature is that there are no systematic reviews regarding anger regulation in both interpersonal and intrapersonal contexts, even though efficient emotion regulation plays a positive role in anger reduction, and, in contrast, inefficient emotion regulation can lead to negative outcomes. For example, effective anger regulation (e.g., attempting to change the situation) has been associated with the constructive conflict resolution style that preserves relationships, long-term health, and well-being (Wranik & Scherer, 2010; Rivers et al., 2007). Research has also focused on intrapersonal anger regulation (e.g., using autobiographical recall) and anger regulation during interpersonal interactions (e.g., Anestis et al., 2009; Denson et al., 2011; Fabiansson et al., 2011; Ray et al., 2008).

We aim to fill the research gap, covering both intrapersonal and interpersonal contexts in one systematic review. We included the studies that addresses the relation between different emotion regulation strategies and anger. Firstly, we defined anger and its positive and negative outcomes. Second, we presented every emotion regulation strategy and its effect on anger. We decided to limit the research to anger only, because this emotion can integrate aggression as well as hostility (Potegal & Stemmler, 2010).

Anger - a negative emotion

As an affective expression (or state), anger can be experienced in various social contexts that involve threat and frustration (Averill, 1982), for example, when people are falsely accused for something, they didn't do (DeCelles et al., 2021). In addition, individuals can have stable thoughts and attitudes regarding the environment which they can assess as anger-inducing (trait anger; Kerr & Schneider, 2008). Anger can be examined from three distinct perspectives: psychophysiology, neuropsychology, and the cognitive-behavioral perspective. This categorizing is viewed in the review of Cox and Harrison (2008). The authors described anger as a multifaceted construct and is subserved by a complex system of subcortical and cortical systems (psychophysiology), is associated with impairment of right hemisphere processes across the visual auditory and motor sensory modalities (neuropsychology) and is determined by

automatic thoughts (e.g., negative perception of others). The evaluation of the situation or environment is caused by these automatic thoughts and influence the subjective emotional experience of anger. So, from a cognitive-behavioral perspective, is very important to target the cognitive misperceptions of the situation that can appear because of the automatic thoughts through cognitive restructuring (Fernandez & Beck, 2001; Toohey, 2021).

Anger is generally described as a negative emotion, but it also contains a positive side involving an active approach, increased alertness, strength, determination, and confidence (Potegal & Stemmler, 2010). Also, Williams (2010) identified three expression characteristics of anger: anger in (holding in anger and directing it towards the self), anger out (openly expressing anger and directing it away from the self) and anger control (the degree of effort to control the external expression and intensity of anger).

There are multiple negative consequences of intense anger. Firstly, it can lead to interpersonal outcomes, including verbal and physical altercations or intimate partner violence (Norlander & Eckhardt, 2005; Novaco, 2011). Secondly, there are the intrapersonal consequences, that are either behavioral (internet addiction or suicide attempts; Giegling et al., 2009; Senormancı et al., 2014) or somatic (e.g., an increased incidence of cardiovascular diseases; Williams, 2010). It is also worth noting that, at an extreme intensity of anger, people tend to be overwhelmed and do things they might not otherwise do (Potegal & Stemmler., 2010). On the positive side, one can mention increasing alertness, strength, determination, and confidence (Potegal & Stemmler, 2010). Anger can also have a facilitation role the case of physical performance (Davis et al., 2010; Robazza & Bortoli, 2007). However, if the emotion of anger promotes the attainment of a long-term goal, people tend to want to feel this emotion and not engage in the process of emotion regulation (Tamir, 2009).

It is important to point out that anger emerges from the way people subjectively evaluate, contextualize, and remember situations or events, and not from specific situations or environmental or biological factors (Potegal & Stemmler, 2010). Thus, the emotion of anger can be subdued or adapted to best fit the interests of the individual. Finding ways to reevaluate, recontextualize or simply not think about a said event or situation might play an important role in regulating or decreasing anger.

Emotion regulation

Emotion regulation represents the ability to influence the experience and expression of emotions (Gross, 1998). People regulate their emotions in various ways. Matthews and collaborators (2021) found different factors that contribute in choosing the emotion regulation strategy: affective factors (e.g., intensity of emotion, specific emotion regulated), cognitive factors (e.g., the effort taken to

regulate that emotion), motivational factors (i.e., the reason they would want to regulate that emotion), and individual factors (e.g., demographic factors). Past research positively related functional emotion regulation strategies with positive indicators of mental health (e.g., life-satisfaction, positive effect; Hu et al., 2014). However, adaptive emotion regulation strategies, such as positive refocusing and reappraisal were used less frequently in response to anger than in response to other negative emotions (Dixon- Gordon et al., 2015; Southward et al., 2019). Moreover, emotion dysregulation can explain the link between negative effect and physical aggression (Donahue et al., 2014). First, we describe each emotion regulation strategy targeted in this systematic review.

Cognitive reappraisal is a healthy strategy (John & Gross, 2004) and a form of cognitive change that is used by individuals to construct a situation that is potentially emotion-eliciting in a way that can change its emotional impact (Lazarus & Alfert, 1964). Thus, the focus is on seeking different interpretations of the meaning or self-relevance of the situation (Gross, 2001). Reappraisal techniques predict increases in positive affect and reductions in negative affect (Boemo et al., 2022). The use of this strategy is, sometimes, tied to instrumental goals (e.g., getting work done) (English et al., 2017). Reappraising a situation is effective when it is used prior to the occurrence of the emotional episode (no longer making it an emotion-eliciting event) or after emotion elicitation (Rivers et al., 2007). Expressive suppression involves inhibiting ongoing emotion-expressive behaviour (Gross, 1998). Rumination is the emotion regulation strategy during which one's attention is focused on their own sad or angry thoughts and feelings (Nolen-Hoeksema & Morrow, 1991). Experiential avoidance is used in attempts to alter or avoid undesirable thoughts or feelings. However, this strategy can lead to emotional disturbance (Kashdan et al., 2010). Distraction is the process of refocusing one's attention from the upsetting event to unrelated neutral content (Ray et al., 2008). Venting is characterized by physical verbal or written expressions of emotions (Parlamis, 2012). Other-blame is frequently used in regulating anger, even though blaming others when you are feeling angry can worsen one's mood by prolonging the experience of emotion (Southward et al., 2019).

By reviewing the emotion regulation strategies associated with anger regulation, we aim to emphasize that, beyond the feeling of intense anger, the regulation strategy used is essential for the outcome, in terms of elicited behaviors and the duration of the emotion. We focused our attention in this review on studies with non-clinical participants (without a psychiatric diagnosis), experimental and correlational studies, and the outcome and results are focused on anger and the impact of emotion regulation strategies on anger.

Method

Protocol

The conduct of this review and quality of reporting are based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. We followed the checklist very closely.

Inclusion criteria and exclusion criteria

The selected studies had only adult healthy (i.e., did not have a psychiatric condition) participants, were published in English up to 2021. Also, the studies did not focus on anger in specific contexts, such as negotiation, business, driving, convicts, include the use of at least one emotion regulation strategy and one measure of anger. We excluded the studies that target underaged participants (defined as a mean age of sample <18 years) and describe data from case studies.

Literature search

We searched in the most relevant journals and databases, such as Proquest, DOAJ, Science Direct, SAGE Journals, Web of Science and Google Scholar. We used the following combinations of keywords: emotion regulation and anger, affect regulation and anger.

Two authors (DG, OC) independently screened the title and abstract of each article to determine which would proceed to a full text review. When the authors were unsure about an article's eligibility, the full article was discussed to see the discrepancies and come to a consensus.

Data extraction

General information related to the study characteristics, including the emotion regulation strategies used, sample size and study design were extracted from each study.

Results

Study selection

The search provided a total of 9337 studies with 7030 remaining after removal of duplicates. After a review of the title, we removed a total of 6799 studies. So, a number of 231 abstracts of studies were assessed. Ninety-eight studies were rejected based on abstract review. Therefore, a total of 133 studies proceeded to full text analysis. After full text review, a remaining of 26 studies

were included in the systematic review. These pieces of information can be seen in Figure 1.

Overview of included studies

Table I presents an overview of the 26 studies included in this systematic review, sorted alphabetically. All the studies were published within 13 years, starting from 2008 until 2021. The number of participants across all studies was 3 489. Samples were composed only of adults.

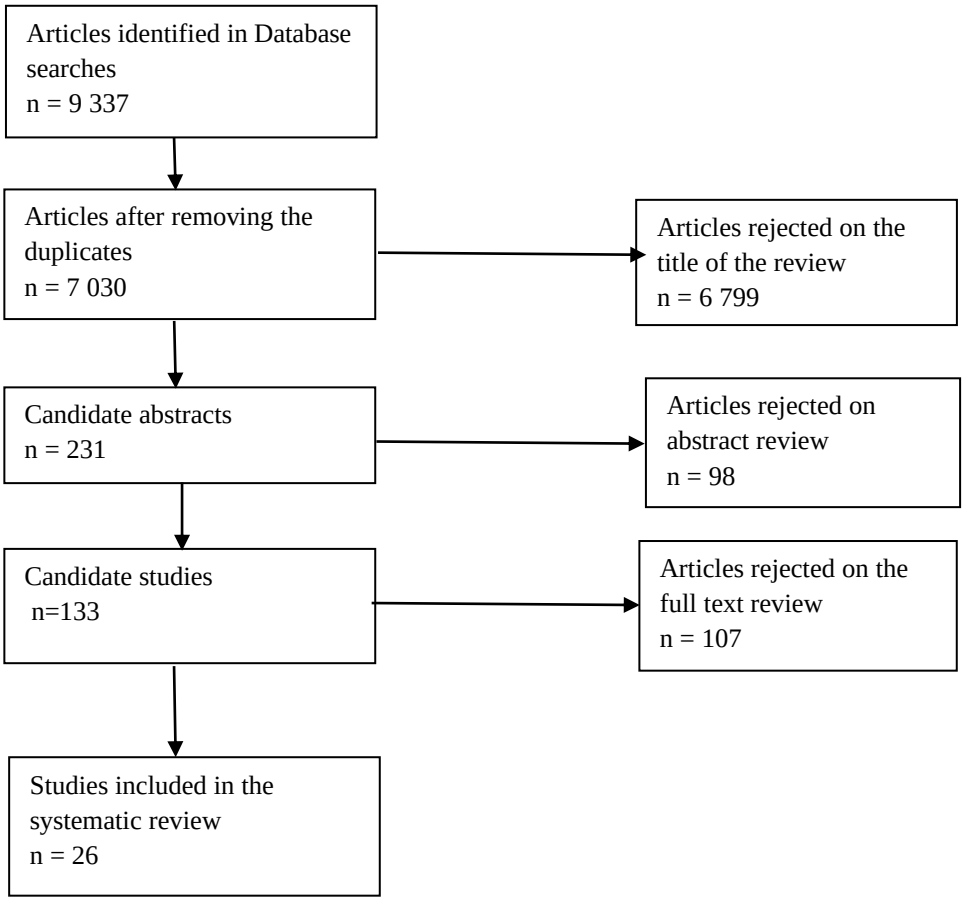

Figure 1. Flowchart detailing article searches, article screenings, data inclusions and data exclusions

Results of individual studies

Our empirical focus is primarily on laboratory-based studies, because these studies offer more control over the variables through the standardization of procedures and the randomization of the participants (Aziz, 2017; Beames et al., 2019). To elicit anger, participants are typically insulted or contradicted by the other (real or fictitious) participants involved in the study (such is in the case of interpersonal focus (e.g., Denson et al., 2011; Leary, Twenge, & Quinlivan, 2006) or invited to recall an anger-inducing event (in the case of autobiographical recall, e.g., Fabiansson et al., 2011; Ray et al., 2008). Then, participants are instructed to use a prespecified anger regulation strategy in response to the emotion of anger. Researchers typically measure the degree to which anger decreases or increases because of the use of various emotion regulation strategies. To provide a more complete image of how anger regulation might function in intrapersonal and interpersonal contexts, we also included studies that contain trait anger or implicit emotion regulation strategies (e.g., Germain and Kangas, 2015; Memedovic et al., 2010).

Table 1. Description of studies that analyze the relationships between emotion regulation and anger according to the selection criteria

Study	Emotion regulation strategies	Sample	Type of study (study design)	Summary of findings
Anestis, Anestis, Selby, & Joiner (2008)	Rumination	16-25 years (N= 200)	Correlational study	High correlation was found between anger rumination and both trait physical aggression and trait verbal aggression. A non-significant relationship between anger rumination and anger was also found.
Bujor & Turliuc (2020)	Cognitive reappraisal Suppression	350 students	Experimental study	Cognitive reappraisal was found to be an adaptive strategy compared to suppression and

				control group.
Denson, Grisham, & Moulds (2011)	Cognitive reappraisal Expressive suppression	131 women (M_{age} = 20.23 years)	Experimental study (interpersonal anger)	Female participants in the reappraisal condition showed increased high heart rate variability compared to the participants in both expressive suppression and control groups.
Denson, Moulds, & Grisham (2012)	Analytical rumination Cognitive reappraisal Distraction	121 participants (M_{age} = 21.26 years)	Experimental study (intrapersonal anger)	When recalling an anger-inducing memory, reappraisal reduced anger and rumination maintained anger. Distraction might offer immediate relief, but may not be an effective long-term strategy.
Dixon-Gordon, Aldao, & De Los Reyes (2015)	Acceptance, cognitive reappraisal, problem solving, experiential avoidance, expressive suppression, self-criticism, rumination	18-32 years (N=562)	Correlational study	The participants reported using less emotion regulation strategies in response to anger compared to sadness.
English, Lee, John, & Gross (2016)	Distraction Expressive suppression	136 participants (M_{age} = 18 years)	Correlational study	The most frequently regulated emotion in low points of the day was anger, and, in high points,

	Cognitive reappraisal			happiness. Distraction and reappraisal were found to be used when regulating for hedonic reasons and were linked to achieving a goal. The participants suppressed their negative emotions (e.g., anger) when other non-close partners were present, to obtain an interpersonal goal (e.g., avoid conflict).
Fabiansson, Denson, Moulds, Grisham, & Schira (2011)	Cognitive reappraisal Analytic rumination Angry rumination	21 participants (M_{age} = 21 years)	Experimental study (intrapersonal anger)	The participants engaged in three emotion regulation strategies: cognitive reappraisal analytical rumination and angry rumination. In the context of an anger-inducing autobiographical memory, the participants in the reappraisal group reported the lowest level of anger followed by analytical rumination and angry rumination.
Germain & Kangas (2015)	Cognitive reappraisal	102 participants	Experimental study (intrapersonal	The participants in both the reappraisal and suppression

	Acceptance Emotional suppression		anger)	conditions reported reductions in state-anger compared to the participants in the acceptance condition, where increased levels of state-anger were reported.
Genuth & Drake (2021)	Distraction	88 participants	Experimental study (intrapersonal anger)	Drawing used as distraction improved the mood, when anger was induced through recalling a anger-inducing situation.
Kashdan, Breen, Afram, & Terhar (2010)	Experiential avoidance	148 students	Qualitative study	Experiential avoidance was not related to inward or outward expressions of anger. In addition, no relation was found between experiential avoidance and anger symptoms.
Krans, Moulds, Grisham, Lang, & Denson (2014)	Angry rumination	110 students (M_{age} = 19.16 years)	Experimental study (intrapersonal anger)	The beliefs about angry rumination can influence the predicted levels of anger in response to anger-provoking situations. The participants in the positive beliefs condition reported lower levels of anger in comparison to the participants in the negative beliefs

				condition.
Martin & Dahlen (2005)	Self-blame, other blame, rumination, catastrophizing, acceptance, putting into perspective, positive refocus, refocus on planning, positive reappraisal	362 participants (M_{age} = 20.46 years)	Correlational study	A positive correlation was found between blaming others and both experience and expression of anger. Rumination significantly predicted trait anger. Anger control was predicted by positive reappraisal.
Mauss, Cook, Cheng, & Gross (2007)	Cognitive reappraisal	111 female students	Experimental study (interpersonal anger)	High reappraisers reported significantly lower levels of anger, less negative emotions, greater cardiac output and ventricular contractility and lesser total peripheral resistance compared to low reappraisers during the neutral baseline as well as during the anger-inducing scenario.
Memedovic, Grisham, Denson, & Moulds (2010)	Cognitive reappraisal Expressive suppression	50 female students' (M_{age}= 21 years)	Correlational study	A negative correlation was found between trait reappraisal and both anger and blood pressure.
Offredi, Caselli, Manfredi, Ruggiero,	Rumination Cognitive	45 participants (M_{age}=	Experimental study (intrapersonal	The participants in the anger rumination

Sassaroli, Liuzzo, & Rovetto (2016)	Reappraisal Distraction	22.79 years)	anger)	condition reported higher levels of anger compared to the participants in both cognitive reappraisal and distraction conditions.
Park & Lee (2011)	Cognitive reappraisal	63 students (M_{age}= 22.43 years)	Experimental study (intrapersonal anger)	If the situation was perceived by the participants as either positive and controllable or negative and uncontrollable, due to cognitive reappraisal, they engaged in low-risk behaviour.
Parlamis (2010)	Venting	17-40 years (N = 52)	Experimental study (intrapersonal anger)	The participants reported that anger expression (venting) and receiving a response can make them feel better, but only if the offender responds in a reinterpreting manner and the third parties in a reinforcing manner.
Pasupathi, Wainryb, Mansfield, & Bourne (2015)	Venting	Study 2: 89 participants (M_{age}= 21.6 years)	Experimental study (intrapersonal anger)	Narrative strategies are effective in reducing distress (e.g., anger) and may be effective for immediate anger regulation.
Quartana &	Expressive	209 participants	Experimental	Both expressive and experiential

Burns (2007)	suppression	(M_{age}=19.6 years)	study	anger suppression conducted to greater pain after pain induction
Ray, Wilhelm, & Gross (2008)	Rumination Cognitive reappraisal	18-27 years (N = 82)	Experimental study (intrapersonal anger)	The participants in the rumination condition reported greater anger experience, more cognitive perseveration and greater sympathetic nervous system activation compared to the participants in the reappraisal group.
Southward, Heiy, & Cheavens (2019)	Acceptance, positive refocusing, reappraisal, problem-solving, other-blame	92 students (M_{age} = 19.73 years)	Correlational study	Reappraisal was found to be effective in responding to anger, the participants reporting being in a better mood. In contrast, a worse mood was reported if the participants use expressive suppression and other-blame to regulate their anger.
Szasz, Szentagotai, & Hofmann (2010)	Cognitive reappraisal Expressive suppression Acceptance	97 students	Experimental study (intrapersonal study)	The participants in the reappraisal condition reported lower levels of anger and persisted significantly longer in the frustrating task than those in both suppression

				and acceptance conditions.
Takebe, Takahashi, & Sato (2016)	Anger rumination	19-22 years (N=75)	Longitudinal study	Anger rumination is directly related to trait anger over time. Regarding low anger rumination, the participants were more likely to evaluate situations as frustrated and to suppress anger.
Takebe, Takahashi, & Sato (2017)	Anger rumination Cognitive Reappraisal	46 students (M_{age} = 20.74 years)	Experimental study (intrapersonal anger)	The participants in the reappraisal group reported fewer angry feelings, more anger-control and less anger-in compared to the participants from both the control group and anger rumination group.
Van Bockstaele, Atticciati, Hiekkaranta, Larsen, & Verschuere (2020)	Distraction Reappraisal	Study 1: 38 students (M_{age} = 20.74 years) Study 2: 38 students (M_{age} = 23.16 years)	Experimental study (intrapersonal anger)	In both experiments, the participants opted for more distraction for intense stimuli compared to mild stimuli. In contrast, they opted for reappraisal as an emotion regulation strategy in the case of mild compared to intense stimuli. Anger was one of the emotions measured in the

				experiments.
VanOyen Witvliet, Knoll, Hinman, & DeYoung (2010)	Compassion-Focused Reappraisal, Benefit-Focused Reappraisal, Rumination	17-26 years (N = 71)	Experimental study (interpersonal anger)	The participants in both reappraisal conditions reported a decrease in aroused, negative emotion (anger) and related facial muscle tension compared to the participants in the rumination group.

Cognitive reappraisal and anger regulation

The first anger regulation strategy that we will approach is cognitive reappraisal. The studies using interpersonal and autobiographic anger-eliciting stimuli shows that cognitive reappraisal is an adaptive mean of managing emotion-laden situations. For example, Denson et al. (2011), in their experiment, recorded heart rate variability (HRV) while female participants viewed an anger-inducing video. In the video, a fellow student expressed a counter position against the participant's point of view on an important political issue. After viewing the video, the participants were instructed either to reappraise, to suppress their emotions or simply watch the video, without any instructions. In the reappraisal condition, some women showed increased high frequency HRV (a biomarker of adaptive emotion regulation and cardiovascular health) compared to other women who suppressed their emotion or were in the control condition. Another study using anger-inducing videos was conducted by Bujor & Turliuc (2020). There was used a short scene of challenge and beating, validated for inducing anger. Cognitive reappraisal was found to be an adaptative strategy. Memedovic et al. (2010) investigated the consequences of trait reappraisal and trait suppression on self-reported anger and blood pressure of female participants. A fictitious participant insulted the participants to elicit the emotion of anger. Reappraisal was associated to lower anger and lower blood pressure following the anger provocation. A similar result was obtained by Mauss and collaborators (2007). In their study, low reappraisers and high reappraisers were made to feel anger (e.g., participants were told that they were moving too often) in the laboratory while cardiovascular responses and emotion experiences were measured. The results show that high reappraisers report feeling significantly less anger, greater cardiac output and ventricular contractility and less peripheral resistance than low reappraisers. vanOyen

Witvliet and collaborators' (2010) results supported that reappraisal decreased negative emotion and related facial muscle tension.

Other studies examined intrapersonal contexts of anger regulation, using autobiographical recall. Fabiansson et al. (2011) conducted a study in which individuals recalled an anger-inducing autobiographical memory. Following this step, these participants were engaged in three emotion regulation conditions: reappraisal, analytical rumination (focusing on the reasons why an event occurred) and angry rumination (focusing on personal angry feelings and thoughts of revenge). Compared to the other strategies, reappraisal produced the lowest levels of self-reported anger. This result is confirmed by Denson et al. (2012) who compared reappraisal, analytical rumination and distraction and their effects on anger experience. The results support the idea that reappraisal significantly reduces anger compared to the other strategies. In addition to these results, participants in the study of Offredi et al. (2016) were oriented through a specific thinking style (rumination, cognitive reappraisal, and distraction) by reading some suggestions to each participant. The results show that cognitive reappraisal has a significantly decreasing effect on anger compared to rumination. Ray et al. (2008) examined the impact of reappraisal and rumination on anger experienced by recalling an event, as well as long-term anger and the physiological response. The reappraisal from a neutral observer's point of view reduced self-reported anger compared to rumination. Also, each time they brought the event to mind, participants who reappraised the event showed a decrease in anger with each repetition, and their physiology reversed to the baseline level. Szasz et al. (2010) compared cognitive reappraisal with suppression and acceptance and found that reappraisal was the most effective strategy for regulating anger in terms of reducing the state of anger. In this condition, individuals also persisted longer in the task that provoked frustration.

Cognitive reappraisal is effective in reducing anger in relation with low-intensity situations (Van Bockstaele et al., 2020). In addition, it is effective for individuals with low trait anger, as well as for people with high trait anger, provoking fewer angry feelings, reducing anger-in ("holding things in") and facilitating anger control (Martin & Dahlen, 2005; Takebe et al., 2017). However, adaptive emotion regulation strategies, such as positive refocusing and reappraisal were used less frequently in response to anger than in response to other negative emotions (Southward et al., 2019), even if individuals reported feeling better after reappraising their anger (English et al., 2017). Cognitive reappraisal can buffer the negative effects of anger rumination, thus reducing the anger (Peuters et al., 2019). This functional strategy is associated with risk-taking behaviour (Park & Lee, 2011). Individuals who perceive a situation as either positive and controllable or negative and uncontrollable, through the

process of cognitive reappraisal, engage in low-risk behaviour (Park & Lee, 2011).

Expressive Suppression and anger regulation

Various studies have reported more unhealthy outcomes for this strategy (John & Gross, 2004). For example, people have reported feeling worse when suppressing anger (Southward et al., 2019), but they use this strategy frequently to regulate anger (Páez et al., 2013). Also, in relation to pain, expressively suppressing your anger during anger provocation is related to greater and physically hurtful pain after subsequent pain induction (Quartana & Burns, 2007). On the contrary, Germain and Kangas (2015) showed that in the case of high levels of trait anger, both reappraisal and suppression offer a short-term reduction of state-anger on both emotional and physiological levels.

Rumination and anger regulation

During rumination, the attention is focused on one's own sad or angry thoughts and feelings (Nolen-Hoeksema & Morrow, 1991). Studies have shown that rumination is a mostly ineffective emotion regulation strategy because it increases the levels of anger (e.g., Denson et al., 2012; Fabiansson et al., 2011, Ray et al., 2008), it prolongs anger well beyond the triggering incident (Wranik & Scherer, 2010) and can predict trait anger (Martin & Dahlen, 2005). Fabiansson et al. (2011) showed that anger rumination can increase anger in the moment of provocation. Offredi et al. (2016) aimed to investigate the effect of rumination on anger. The results show that participants in the anger rumination condition report higher levels of anger compared to participants in the cognitive reappraisal and distraction conditions. The results of a longitudinal study conducted by Takebe et al. (2016) indicate that. Compared to the low anger rumination group, the high anger rumination group was more likely to respond to various situations with frustration and to suppress anger. Also, Takebe et al. (2017) showed that anger rumination provoked more angry feelings and was not helpful in reducing internalization of anger (anger-in) and in facilitated the control on anger, compared to cognitive reappraisal. Ray et al. (2008) focused on the differences between reappraisal and rumination on anger experience. Participants in the rumination condition reported greater anger experience.

In contrast, Krans et al. (2014) conducted a study in which they manipulated the beliefs (positive or negative) about rumination. For the positive perspective, the participants were told that using rumination would help them, for example in solving a problem. In contrast, a negative perspective about rumination focuses on the negative outcomes of using this emotion regulation strategy (e.g., not helping in problem solving). The results show that a positive perspective about rumination can influence individual perception of lower levels

of anger (Krans et al., 2014). Also, Denson et al. (2012) described two types of rumination and different implications of anger experiences: individuals who ruminated in a cool (detached) manner reported less anger, in a similar degree of anger to the participants who reappraised their emotion, than those who ruminated in a hot (emotionally evocative) manner (Denson et al., 2012). In addition, Anestis et al. (2009) showed that anger rumination is a significant predictor of trait physical and trait verbal aggression as well as hostility but not of anger.

Experiential avoidance and anger regulation

People attempt to alter or avoid undesirable and negative thoughts or feelings (Kashdan et al., 2010). A wide range of outcomes (e.g., anxiety sensitivity) are associated with the over-reliance on this emotion regulation strategy (Kashdan et al., 2006). High emotion intensity is associated with considerable overall use of emotion strategies, mainly with higher levels of emotional disengagement (e.g., experiential avoidance) (Dixon-Gordon et al., 2015). Experiential avoidance, used as a regulatory strategy after feeling rejected, can increase the likelihood of internalized and externalized anger (Leary et al., 2006). In contrast, Kashdan et al. (2010) and Dixon-Gordon et al. (2015) showed that experiential avoidance is less relevant to symptoms of anger.

Other emotion regulation strategies used in anger regulation

There is a small body of evidence in support of the impact of the following emotion regulation strategies on anger and its intensity. We considered including these studies in one single subchapter.

Distraction can be defined as the process of refocusing one's attention from the upsetting event to unrelated neutral content (Ray et al., 2008) or as actively redirecting attention from the anger-inducing event (Denson et al., 2012). This strategy is used in relation with high-intensity negative situations because it might offer immediate calmness (Van Bockstaele et al., 2020). However, it may not be an effective long-term strategy, because it is not problem solving-oriented (Denson et al., 2012). Also, this strategy is used more when regulating to feel better (e.g., when the person is angry) and is tied to instrumental goals (English et al., 2017). Another way to distract from anger is through drawing (Diliberto-Macaluso & Stubblefield, 2015). Genuth and Drake (2021) showed that mood improved when drawing is used to distract from anger-inducing situation.

Venting is characterized by physical, verbal, or written expressions of emotion (Parlamis, 2012). Parlamis (2012) found that venting (anger expression) and receiving a response was reported to make individuals feel better, but only if the offender responds in a reinterpreting manner, and the third parties respond in

a reinforcing manner. Pasupathi et al. (2017) focused on narrative strategies, showing that the narrative act should contain past-tense vocabulary to be effective in order to reduse distress (e.g., anger) generated by films and personal memories; distress for personal experiences can be downregulated by using positive emotion language-use and may be effective for immediate regulation of anger.

The last emotion regulation strategy addressed in this study is *other-blame* strategy. People are more likely to blame others when they are experiencing anger, because this emotion can be a result of a perceived transgression and individuals are more likely to identify a transgressor (Southward et al., 2019). On the other hand, people have reported feeling worse when using other-blame and a longer experience of the emotion (Southward et al., 2019).

Discussion

This systematic review examined the efficacy of anger regulation strategies on anger. It is already known that if reappraisal is frequently used, the self-reported emotion is changed (for review see McRae & Gross, 2020). For anger regulation, the evidence supports that cognitive reappraisal, distraction and venting are effective strategies in reducing anger. At an interpersonal level, cognitive reappraisal reduces anger when participants are insulted (Memedovic et al., 2010) and when someone has a contradictory opinion (Denson et al., 2011). In the case of recalled anger-inducing autobiographical memory (intrapersonal level), reappraisal produces the lowest levels of self-reported anger compared to rumination (Denson et al, 2012; Fabiansson et al., 2011; Offredi et al., 2016) and compared to suppression and acceptance (Szasz et al., 2010). Distraction offers immediate calmness and is used in relation with high-intensity negative situations (Van Bockstaele et al., 2020). Venting and receiving a response were reported to make individuals feel better in anger related situations (Parlamis, 2012).

On the other hand, rumination, and expressive suppression, along with other emotion regulation strategies (e.g., other-blame and experiential avoidance), showed a negative effect on anger, prolonging the emotion and intensifying the subjective experience of this emotion. People reported feeling worse when suppressing anger (Southward et al., 2019), but they use this strategy frequently to regulate anger (Páez et al., 2013). Experiential avoidance can increase the likelihood of internalized and externalized anger (Leary et al., 2006). Individuals frequently blame others to regulate anger even if they reported feeling worse (Southward et al., 2019).

It is important to emphasize that effective anger regulation can reduce anger. If anger is reduced, other problems associated with anger (e.g., violence,

suicide) can be prevented or diminished. Even if people feel intense anger, functional emotion regulation strategies can buffer the negative effects of this emotion on one's emotional state as well as relations with other people. Practitioners can use these results to adapt their focus during therapy sessions on the mechanisms of action in anger regulation, for example, to focus on how people evaluate the situations and how this evaluation can produce negative emotions. Also, they can identify what type of dysfunctional strategy people use and offer a more adaptive response.

We must note that some studies showed that, in particular situations, all emotion strategies (mentioned in this study) can be useful. For example, Germain and Kangas (2015) showed that, in the case of high levels of trait anger, both reappraisal and suppression are effective when it comes to reducing state-anger in the short-term. English et al. (2017) found that suppression was more likely to be used for contra-hedonic regulation (e.g., decreasing positive emotions during high points of emotional experience) and was linked to the social features of the context (e.g., when non-close partners were present) and when people had interpersonal goals (e.g., to avoid conflict). Thus, the context of anger regulation is important. For instance, distraction can offer immediate calmness but is not problem-solving oriented (Denson et al. 2012). Also, the type of rumination used (e.g., cool manner or hot manner) can influence the intensity of anger (Denson et al., 2012). The authors showed that people who ruminated in a detached manner (cool manner) reported less anger in a similar degree to a participant who reappraises their emotion. In addition, Denson et al. (2012) claimed that rumination is a dysfunctional anger regulation strategy only in some circumstances (e.g., repeatedly using this strategy to regulate one's emotion of anger). Also, thinking that rumination can help in problem solving (positive perspective), it might influence the perception of lower levels of anger (Krans et al., 2014). Moreover, Anestis et al. (2009) showed that anger rumination is a significant predictor of physical and verbal aggression and hostility, but not of anger.

As practitioners, it is necessary to be flexible and recommend emotion regulation strategies depending on the context of the patient. For example, for socially anxious patients is better to suppress anger in social contexts because expressing anger may increase the threat of negative evaluation (Conrad et al., 2021). Even cognitive reappraisal is not always helpful (Ford & Troy, 2019). The authors support the idea that reappraisal is not always successful because individuals are not skilled in reappraisal, and, also, successful reappraisal is sometimes dysfunctional because people can feel unauthentic reducing the negative emotion. Still, cognitive reappraisal can be learned and is enhanced through a state of mindfulness during meditation (Garland et al., 2015). Also, therapy should target dysfunctional emotion regulation strategies, such as anger

rumination (Contreras et al., 2021) and use strategies to put into perspective the use of different strategies of emotion regulation (i.e., pros and cons of use a strategy or another) to help patients to choose the most efficient strategy to regulate emotion, taking in account the type of situation and their objectives. For example, suppression is considered a dysfunctional emotion regulation strategy because it offers only a short-term reduction of state-anger on both emotional and physiological levels (Germain & Kangas, 2015). Also, distraction might offer immediate calmness in high-intensity negative situations (Van Bockstaele et al., 2020), but it is not effective long-term because it is not oriented through problem-solving (Denson et al., 2012).

We can see a difference between the number of studies focused on cognitive reappraisal or expressive suppression and other anger regulation strategies. As it can be seen, there are mixed results related to expressive suppression, rumination, and cognitive reappraisal. One explanation is mentioned by Dixon-Gordon et al. (2015) which points out that people have a tendency to use fewer strategies generally in response to anger. This can be a reason why there are mixed findings regarding emotion regulation strategies. Another explanation could be that it can be a mediator, such as low emotion differentiation (which involves experiencing and labelling emotions in a granular way) that may prevent someone from successful emotion regulation (Kalokerinos et al., 2019) and that may be linked to more daily aggressive tendencies when angry (Pond et al., 2012). Other mediators that can influence the efficient use of emotion regulation strategies would be the presence of a borderline personality disorder (Daros & Williams, 2019) or gender (Evers et al., 2011).

Limitations

Although this is the first systematic review focused on anger regulation, it is not without limitations. First, more studies had focused on the effects of cognitive reappraisal and fewer studies on the effects of other emotion regulation strategies on anger. Second, this review included just a longitudinal study. Despite that we used both correlational and experimental studies in our review; we cannot compare the results given the differences in methodologies used by the studies. Third, most of the participants in the studies included in the systematic review were students or very young. We recommend being cautious about the generalization of the results to a more aged population.

These findings show that more laboratory-based studies are needed. Future studies should further manipulate the type of emotion regulation and put participants in different anger-eliciting contexts. Various mediators should be taken into account in the relation between emotion regulation and anger (e.g., emotion differentiation; attachment; O'Toole et al., 2014, Shaver & Mikulincer,

2014). Also, a valuable contribution to the research literature would be a qualitative study that explores the cognitions behind every type of emotion regulation and the reasons people use different types of emotion regulation strategies. This way, the researchers would have a clearer view of the reason why people use strategies that are considered dysfunctional and still have a positive outcome.

Conclusion

This systematic review indicates that cognitive reappraisal, expressive suppression, distraction, experiential avoidance, venting, other-blame, and rumination have a different impact on the subjective experience of anger. Along with cognitive reappraisal, expressive suppression is one of the most studied emotion regulation strategies**.** Some strategies can have a positive impact, reducing the intensity of emotion, while others can be dysfunctional and do not help the individual much in dealing with anger. The data for suppression and anger rumination are mixed, but we can see the substantial positive impact of cognitive reappraisal on anger.

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