Trends in Cognitive Sciences

CellPress

Special Focus on Emotion

Feature Review

The Social Regulation of Emotion: An Integrative, Cross-Disciplinary Model

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Research in emotion regulation has largely focused on how people manage their own emotions, but there is a growing recognition that the ways in which we regulate the emotions of others also are important. Drawing on work from diverse disciplines, we propose an integrative model of the psychological and neural processes supporting the social regulation of emotion. This organizing framework, the 'social regulatory cycle', specifies at multiple levels of description the act of regulating another person's emotions as well as the experience of being a target of regulation. The cycle describes the processing stages that lead regulators to attempt to change the emotions of a target person, the impact of regulation on the processes that generate emotions in the target, and the underlying neural systems.

Trends

Successfully regulating emotions has been linked to numerous advantageous outcomes, including improved mental and physical health, as well as enhanced social functioning.

While research on emotion regulation has advanced markedly in the past few decades, most work has focused on the self-regulation of emotion (that is, how people regulate their own emotions).

There is a growing recognition that enhanced understanding of the social regulation of emotion (how people regulate the emotions of others) is also vitally important.

Research insights into the social regulation of emotion often occur in diverse disciplines, and a cross-disciplinary model would promote the integration of findings from across separate fields of study.

Beyond the Individual: The Social Regulation of Emotion

Whether we are angry about a disagreement at work, struggling after a breakup, or saddened by the loss of a loved one, the ability to regulate our emotions is essential for maintaining mental health, social functioning, and physical well-being. The past twenty years have seen enormous growth in research on emotion regulation [1]. For the most part this work has focused on the ability of an individual to self-regulate their emotions. Experiments have examined how specific regulatory strategies relate to behavioral, experiential, and physiological outcomes [2]. Neuroimaging studies focusing primarily on cognitive means of controlling emotion have shown that effective regulation is supported by prefrontal systems that modulate activity in largely subcortical systems that generate emotions [3]. In addition, multilevel models [4] have been proposed that describe links between the use of specific strategies, supporting cognitive and affective processes, and the underlying neural systems.

As significant as these empirical and theoretical advances have been, there is growing recognition that understanding how people regulate each other's emotions is important as well. The social regulation of emotion refers to one individual (the regulator) deliberately attempting to change the emotional response of another individual (the target), and several literatures have examined social regulatory phenomena. Developmental research has examined the socialization of emotions in children, highlighting that social regulation not only improves the current emotional state of the child but also enhances their capacity to self-regulate in the future [5,6]. Social and clinical studies of romantic couples emphasize the bidirectional nature of emotional expression and experience, embedding both target and regulator in a continuous exchange where both mutually shape one another's outcomes [7]. Organizational behavior research underscores the relational benefits of social emotion regulation, particularly with respect to building trust [8–10]. In addition, research in social cognitive neuroscience provides insights into the psychological

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processes and neural systems supporting the engagement of individuals in social emotion regulation [3,11].

Social regulation is important partly because self-regulation can be challenging for several reasons. For one, people often lack insight into their emotional reactions, occasionally misattributing the source or even the positive or negative nature of their arousal [12,13], whereas outside observers may be more accurate in these judgments [14,15]. For another, emotional responses promote affect-congruent thinking that helps to sustain affective reactions [16] and disrupts prefrontally based control systems that support self-regulation [17–20]. Furthermore, some individuals have generally reduced self-regulatory capacity, whether because of immature (e.g., children) [21], declining (e.g., elderly) [22], or impaired (e.g., psychiatric populations) [23] prefrontal function. In such cases, a social regulator can use their executive capacity to implement regulatory strategies on behalf of the target.

As empirical investigation of the social regulation of emotion continues to expand in these diverse fields, it is increasingly important to integrate the insights gained in each to achieve a comprehensive perspective. To date, however, such integration has been minimal and progress has often occurred in silos within these literatures. The goal of this review is to provide an integrative and comprehensive framework for understanding the social regulation of emotion that can bridge the myriad ways in which it has historically been studied and to identify opportunities for future research. As such, this review differs from previous reviews of the social regulation of emotion that have focused on describing lay conceptions of the phenomenon [24], identifying social motivations for self-regulating emotions [25], or the benefits to social relationships of interpersonal emotion regulation [7]. Instead, this review aims to synthesize current knowledge across a range of disciplines to elucidate the approaches regulators use when attempting to manage targets' emotions, the psychological processes involved, and the neural systems that support them. The overarching goal is specifying a working model of the social regulation of emotion. Although this model is somewhat preliminary, given the current state of cross-disciplinary work in this area, our intention is to generate an organizing framework and testable predictions that can guide future behavioral and neuroscience research.

Towards these ends, the review has three parts. In the first, we define social regulation as distinct from other related constructs, and introduce the social regulatory cycle (SRC). The SRC specifies a sequence of processing steps involved when one person seeks to regulate the emotions of another person, and, as such, can be used to organize findings and theories from diverse fields. The second and third parts unpack SRC processing stages from the perspectives of the regulator and the target. Although scant neuroscience research has examined many aspects of the SRC, we draw on related literatures to posit likely neural bases. Finally, we conclude with a discussion of the potential applications of this model to various research domains and suggest directions for future research.

The SRC

To date, emotion regulation research has focused primarily on how people manage their own emotions. While the majority of self-regulatory attempts occur in social contexts [26] and have ramifications for social functioning (Box 1), self-regulation is distinct from the social regulation of emotion. Social regulation occurs when one person seeks to alter the emotional responses of another person. Instead of merely suggesting regulatory strategies to others, social emotion regulators pursue strategies to change the nature, duration, or intensity of the emotional experience and expression of a target individual. The goal-driven nature of social regulation distinguishes it from related phenomena, such as social sharing, empathy, or emotional contagion, where one person's actions are not strategically directed towards influencing another's emotions. While the social regulation of emotion may be precipitated by implicit

Box 1. Social Consequences of Self-Regulating Emotion

Although emotions are inherently social phenomena that are used to coordinate and communicate information among individuals [31,119], and most attempts at self-regulating emotion occur in social contexts [26], previous research has rarely examined the impact of emotion regulation on social dynamics [25]. That said, extant work suggests that those who are more successful at self-regulating emotion experience fewer interpersonal conflicts and tend to have higher-quality relationships [120]. Such work typically contrasts the effects of differing strategies (such as reappraisal and behavioral suppression) in shaping interpersonal relationships. For example, habitual use of behavioral suppression decreases relationship closeness, whereas reappraisal increases both peer ratings of likeability and relationship closeness [121]. Similarly, among students transitioning to college, frequent use of behavioral suppression led to less social support from friends, fewer close relationships with others, and less satisfaction in relationships [122,123]. The interpersonal costs of behavioral suppression may emerge due to feelings of inauthenticity for the regulator [109] or tension during interactions in which one party is suppressing their reactions. In laboratory studies of dyadic interactions, when one party engages in behavioral suppression, blood pressure and negative affect increase for both parties, and relationship-building is disrupted [111]. By contrast, using reappraisal is associated with closer interpersonal relationships and higher social status over time [122], and interventions involving reappraisal improve reactions to conflict. For example, asking spouses to reappraise a source of conflict in their marriage improves marital satisfaction over time [124], and engaging in reappraisal during an intractable conflict leads people to experience less negative emotion aimed at the other party and support efforts at reconciliation [125]. These findings suggest that effective self-regulation of emotion improves interpersonal interactions.

processes [27], the present review focuses predominantly on the regulatory goals and strategies that are available to awareness.

We conceptualize the social regulation of emotion as a fundamentally interpersonal SRC that involves a dynamic, interacting sequence of processing stages for both the regulator and the target. While this conceptualization integrates influences from multiple research areas, three literatures most strongly inform its multilevel, cyclical nature. The first is social and developmental research on dyadic relationships, which emphasize the bidirectional nature of emotions and the consequences of social regulatory phenomena [6,7], but have not considered the underlying neural systems. The second is behavioral and brain research on the self-regulation of emotion, which provides models for conceptualizing regulation as an iterative cycle and clarifies the mechanisms underlying different classes of strategies [2,18]. The third is the literature on social support, which examines how one person can beneficially impact others [28,29], but does not make emotion the primary focus and often conceptualizes support provision as a contextual factor whose constituent psychological and neural processes are not interrogated. The SRC is a prototype model, informed by findings from each of these research areas, that generates predictions about the underlying processes involved in the social regulation of emotion. One benefit of the SRC is that it allows any given instance of social regulation to be conceptualized in terms of the specific types of processes unfolding for both regulators and targets. This permits a description for each stage of the cycle, at multiple levels of analysis, of the relevant behaviors, underlying psychological processes, and supporting neural systems. These multilevel descriptions generate numerous useful predictions, including explaining why social regulatory behaviors lead to particular outcomes.

Integrating these literatures, we define socially regulating others' emotions as a cyclical process bearing similarities to the self-regulation of emotion [30] but distinct from it in a fundamental way (Figure 1). In self-regulation, the regulator and target are the same person, using prefrontal control systems to regulate activity in their emotion-generation systems. By contrast, during the social regulation of emotion, the regulator and target are different agents, which means that the control systems engaged by a regulator impact emotion-generation systems in a separate target, and systems for social cognition are deployed by the regulator to interpret the target's emotions and by the target to infer the regulator's intentions. Below we unpack these and other elements of the SRC, first from the perspective of the regulator and then from the perspective of the target. Because social regulation is in many ways more complex for the regulator than for the target, the discussion primarily focuses on regulators rather than targets.

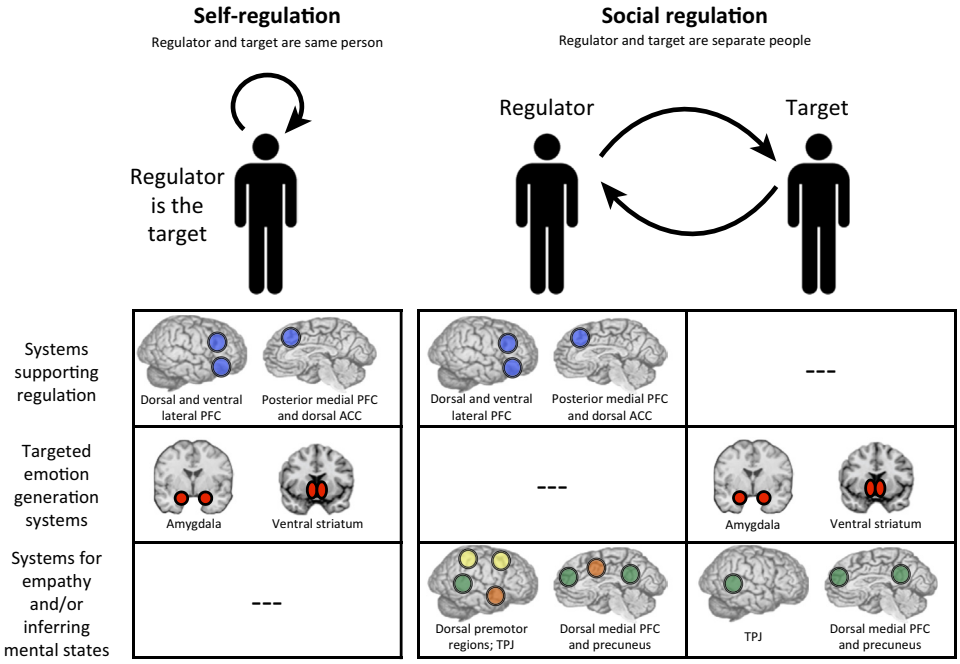


Figure 1. The Social Regulation of Emotion. (A) Unlike self-regulation, in which the regulator and the target are the same actor, the social regulation of emotion involves two separate people engaging in an iterative and dynamic cycle in which one's actions shape the other's responses. (B) This fundamental dissociation between agents has ramifications for the underlying neural circuitry involved. In self-regulation, systems supporting regulation and the emotion-generation systems they target reside in the same agent. In the social regulation of emotion, these processes reside in separate agents, with the control systems of the regulator responding to and acting on the emotion-generation system of the target. Importantly, this increased social complexity also places demands on relevant social cognitive systems. As a result, both parties engage mentalizing systems (depicted in green), and the regulators are more likely to mobilize regions of the action identification system (yellow) and systems for empathic sharing of the emotional states of others (orange). Abbreviations: ACC, anterior cingulate cortex; PFC, prefrontal cortex; TPJ, temporal–parietal junction.

Social Regulation from the Perspective of the Regulator

Regulators engage a complex set of cognitive and affective processes to infer the emotions of a target, to decide whether to regulate, weigh potential strategies, and ultimately implement one (Figure 2, Key Figure). While no studies have directly examined relevant neural systems in the context of social regulation *per se*, for each stage we discuss likely neural systems supporting the SRC (Figure 3).

Identification

The cycle begins with identifying the current emotional state of the target (Figure 2) which communicates important information to the regulator [31,32]: emotional displays can signal a desire for support (e.g., sadness), behavioral modification (e.g., anger), or satisfaction (e.g., happiness). Because regulators do not have direct access to the target's internal states, accurately identifying their emotions can be challenging, and incorrect inferences create problems for subsequent stages of the regulatory cycle. Regulators do have access to expressive behaviors and to the external context [33,34], however, and from these cues can draw relevant inferences, including the nature of the emotion, what stimuli triggered it, and likely appraisals by the target.

Numerous person perception investigations have shown that three types of brain regions support empathic understanding of the target's emotions and social cognitive insight into the causes of their reactions [35–37]. First, the amygdala responds to relevant social cues

Key Figure

The Social Regulatory Cycle

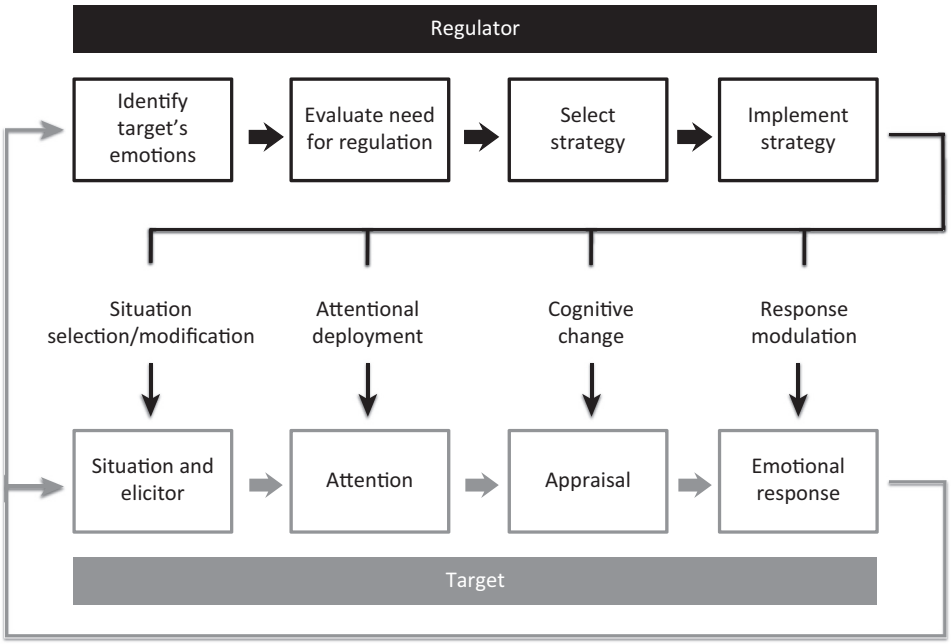


Figure 2. Managing the emotional state of others involves several core psychological processes. For the regulator (top half of panel; black lines), the cycle begins with reading the emotional state of the target. Second, the regulator must evaluate whether the current emotion differs from a desired, or goal, emotional state. If the regulator decides to intervene, they must subsequently generate candidate strategies for managing the emotions of the target and select an appropriate approach. Finally, the regulator must implement their selected strategy (see text for details of possible strategies) which can impinge on any of multiple stages in the emotion-generation sequence of the target. For the target (bottom half of panel; grey lines), the cycle begins with their perception of the stimuli/situations eliciting the emotion that kicked off the cycle, but, as time goes on, it also includes their perception of the regulator. The second step involves attention to various aspects of the initial elicitor and the regulator. The third step involves appraisals of the meaning of the elicitors – which can be shaped by the regulator's actions – and in turn may lead the targets to appraise those actions. Finally, the target's behavioral, physiological, and experiential manifestation of emotion may themselves be targets for regulator intervention.

– including those providing clues to the emotions of the target – and may provide a coarse interpretation of some of them (e.g., fear expressions [38,39]). The second is the mentalizing system, centered around dorsal medial prefrontal cortex, precuneus, and temporal-parietal junction, which supports assessments of mental states (including emotions, goals, and beliefs) [11,40,41]. The third includes motor and affective regions centered around premotor cortex and inferior parietal lobule, and the mid-cingulate and insular cortices, respectively. These regions activate in the regulator when she observes the target, thereby supporting vicarious understanding of the motor intentions and affective states of the target. The motor regions support implicit mimicry, mirroring, and explicit judgments about the behaviors of others [11,40–44], whereas the affective regions support vicarious understanding of others' pain [45].

Evaluation

The next step is evaluating the need for social regulation by assessing the divergence between the (inferred) current emotional state of the target and a desired, or goal, emotional state for the

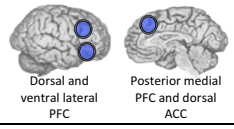
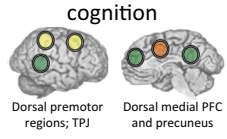
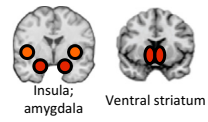
Stage of processing for regulator	Type of brain system: Cognitive control 	Empathy/social cognition 	Affective responding 
Identify target's emotions	---	Empathic understanding, mentalizing, action identification, empathic sharing of affective states	Signal presence of goal-relevant target cues (like facial expressions); empathic sharing of affective states
Evaluate need for regulation	Detecting deviations between current and goal emotional states	Inferring distance from goal emotional state	Reinforcing social regulatory actions, including motivating prosocial behaviors
Select strategy	Generating and maintaining possible strategies	Simulating target responses to potential strategies	---
Implement strategy	Enhance goal-directed activities; monitor regulation	---	---

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Figure 3. Neural Systems Underlying Social Regulatory Processes. When engaging in the social regulation of emotion, regulators engage a core set of three neural systems, including regions for cognitive control, social cognition, and affect generation. Each supports specific psychological processes at each stage of the social regulatory cycle. Abbreviations: ACC, anterior cingulate cortex; PFC, prefrontal cortex; TPJ, temporal–parietal junction–, minimally engaged.

target. When the gap between the current and goal states is small, regulators may decide not to intervene, but, if the difference is sufficiently large, regulation may be deemed necessary. In some cases, targets may explicitly solicit the regulator's intervention to help them regulate their emotions. Notably, people often offer more regulatory support than they seek [46], suggesting that social regulation is often initiated by regulators rather than being solicited by targets. However, little empirical research has examined how regulators define goal states and what motivations guide their regulatory attempts [25].

That said, we make two points about the motivations underlying social regulation. The first concerns the degree to which the regulator and the target have similar goals for the target's emotional state. Empirical research generally has focused on the case of similar prosocial goals (e.g., both wanting the target to feel more positive and less negative emotion), particularly in parental, marital, or clinical relationships, and these instances are the focus of this review. Cases where the regulator has self-serving motives that diverge from the target's goals are likely also prevalent, especially in competitive contexts [47–49], but less is known about them. The second concerns the extent to which adjusting the target's emotional state, *per se*, is the primary goal for regulators, or whether regulation is undertaken in the service of another end. Social regulation can offer a means to coordinate goals and behaviors between multiple parties [25], including preparing the target to interact with the regulator in a way that facilitates the control of the regulator over the situation [50]. Social regulation may also be used to foster the target's own self-regulatory abilities. For example, some parents adopt a coaching philosophy with respect to their children's emotions, viewing social regulation as an opportunity to teach their children

about feelings, develop problem-solving skills, and build intimacy [51]. In these cases, the child achieving a desired short-term emotional state is subordinate to higher-order long-term goals.

Three systems likely support the evaluation step. First, mentalizing systems support inferences about the goal emotional state of the target [52], and may in turn prosocially motivate regulation by translating concern for the target into action [52,53]. Second, performance monitoring systems in posterior dorsomedial prefrontal cortex track the discrepancy between these states and signal when additional executive control is needed [54–57]. Detecting deviations from goal states is essential to evaluating whether regulation is required as well as monitoring the impact of a selected and implemented strategy, as noted below. These conflict-detection systems mobilize control processes in other systems, such as relevant social cognitive [58] or emotion-processing networks [59,60]. Third, reward systems – including ventromedial prefrontal regions and the ventral striatum – socially reinforce regulatory behaviors and generate reward expectancies for future regulatory behaviors [61].

Strategy Selection

Once the regulator decides to regulate, they must select an appropriate means of socially regulating the emotions of the target. Although strategy selection is essential to self-regulation [62], there has been relatively little relevant research in the context of social regulation. Research to date suggests three factors guide the strategy selection process.

First, the regulator may weigh passive inaction against active engagement. A regulator could decide to remain passive, even though the target's emotions require regulation, for several reasons. The regulator could decide the target is capable of self-regulating their emotions on their own, or that attempting to self-regulate is in the best interests of the target [5]. The regulator also may determine another person is better positioned to engage in social regulation and decide not to engage personally (e.g., as when a negotiator decides to allow a designated mediator to engage with an upset counterpart). In such circumstances, the regulator may decide not to intervene and continue to monitor the target's emotional state.

Second, the regulator's knowledge of different possible strategies will determine the range of options that are considered and at which stage in the emotion-generation process they choose to intervene. A regulator's past experience in successfully managing their own and others' emotions, as well as their experiences in being socially regulated by others, informs their consideration of different approaches [37,51]. Exposure to or training in specific strategies enhances the likelihood a regulator will consider and potentially implement a particular approach [63].

Finally, regulators must forecast how the target will react to a particular regulatory strategy. Multiple factors will shape target responses to regulation, and a key consideration for the regulator is whether they should make their regulatory attempts visible, direct, and explicit or invisible, indirect, and implicit [28,64]. To the extent a regulator anticipates that the target will react negatively to their regulatory overtures, they may select a less-visible regulation approach. As with mentalizing in the identification stage, errors in inferring the target's reactions to particular strategies can lead to less-effective regulation or target reactance.

Related neuroscience literatures suggest that two types of systems will support strategy selection. First, the systems for mentalizing and action identification once again may be mobilized, in this case to simulate the impact of a strategy on a target's emotions [11,40,44]. Second, ventrolateral prefrontal systems implicated in selecting goal-relevant information from memory [65,66] could retrieve knowledge about possible strategies that might be implemented in the current situation.

Implementation

The final stage for the regulator is implementing a selected strategy. Of the steps in the SRC, this stage is the one that we know the most about from multiple disciplinary perspectives. Drawing on process models of the self-regulation of emotion [2,18], four classes of strategies can be distinguished in terms of their impact on different steps in the target's emotion-generation sequence (described in the following sections; Figure 4). While some neuroscience research has asked how select forms of social regulation impact activation of a target's brain systems for emotional responding, to date no work has asked what regions regulators use to implement strategies. However, it is reasonable to hypothesize that the systems used to implement strategies via self-regulation would be used to implement them via social regulation as well (Figure 1). Thus, we predict the involvement of lateral prefrontal systems in maintaining and implementing regulatory goals, as well as of posterior medial prefrontal regions that monitor whether strategies are being effectively implemented [18,67].

Situation Selection and Modification

The first class of strategies involves changing the situation – and its attendant emotion elicitors – to which a target is exposed. In situation selection, a regulator steers the target toward environments that promote a desired emotional reaction or away from circumstances that elicit undesired reactions. In situation modification, the regulator alters the stimulus (changing its nature, duration, or intensity) that triggered the emotion in need of regulation, or introduces or removes stimuli that change the way the target reacts to that initial trigger. Although in principle there are myriad ways to enact these strategies, two different means have received the most empirical attention.

The first involves changing the physical proximity of a stimulus. Following relevant work in the context of self-regulation ([62], B. Dore *et al.* unpublished), strategies that involve distancing the target from an upsetting stimulus and into an alternative situation are highly effective but are not always available. For example, a wife could suggest to her husband that he avoid encounters with a friend with whom he tends to argue (situation selection) or could suggest that he should stay physically distant from the friend when they unavoidably meet at social functions (situation modification). Such strategies may be especially effective when the regulator has greater control over the context or elicitor than the target does. This may be true in organizational contexts, where managers and mediators can alter circumstances to manage interpersonal conflicts. Mediators are often trained to caucus separately with disputants when either party becomes distressed [68], creating a context for more open and less negatively charged communication

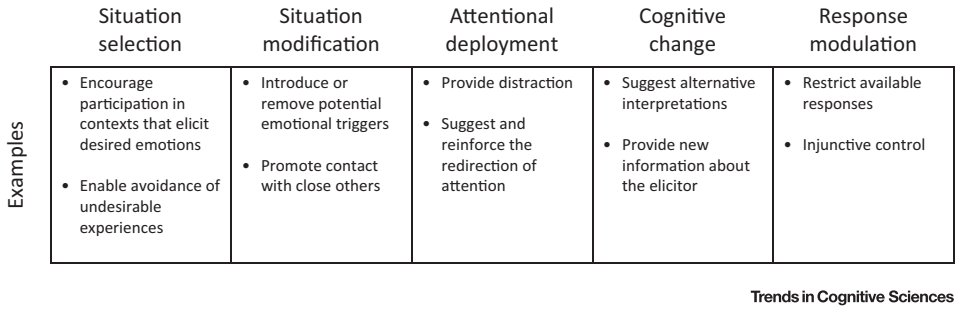

Figure 4. Examples of Social Regulatory Strategies Targeting Different Phases of the Emotion-Generation Process. Research examining the self-regulation of emotion categorizes regulatory strategies based on which phase in the emotion-generation process the strategy targets. In a similar fashion, the social regulation of emotion also involves strategies that impinge upon different phases in the emotion-generation cycle of the target. Regulators may choose to change features of the situation or elicitor, how the target directs attention to those features, the interpretation of their meaning by the target, or the outward affective behavior of the target.

[63]. Similar findings are seen in developmental contexts, where parents modify an upsetting situation to quell the distress of their child [69].

A second type of situation-focused regulation occurs when another person's physical presence helps the target to respond more adaptively to stimuli. For example, rats and human children introduced to a stressful situation with a familiar companion are more likely to explore than those with an unfamiliar other [70,71]. Maternal grooming alters stress reactivity in rat pups, upregulating the expression of genes for hippocampal glucocorticoid receptors that downregulate the activity of the hypothalamus–pituitary–adrenal (HPA) axis [72]. In adult humans, the presence of supportive others diminishes requests for pain medication during childbirth [73] and reduces recovery time among patients [74], and holding the hand of a close other – or even only seeing their photograph – can reduce self-reports and neural markers of negative affect elicited by the anticipation of electric shock [75–77].

Generally speaking, situation-focused regulation also can be proactive rather than reactive, as when the regulator anticipates the potential emotional response of the target and alters the environment so as to change the expected reaction. This may be essential in conflict management, where meeting with a disputant in advance of mediation to learn their likely emotional triggers helps the mediator to structure the discussion to maintain the emotional equilibria of all the parties [63]. Under such circumstances, the identification stage is altered for the regulator because they are responding to an anticipated emotional reaction by the target rather than to an existing one.

Attentional Deployment

Emotional elicitors draw attention [78,79] and regulators can modify a target's emotions by shifting their attention away from undesirable elicitors and towards others. Returning to the example of the man arguing with his friend at a social gathering, his wife might draw his attention to someone else in the room and reinforce that redeployment of attention by focusing her attention on them as well. Interpersonally initiated attentional deployment may be especially effective because shared focus with another person reinforces and perpetuates the redirection of attention. This has been a focus of the developmental literature where attentional deployment is challenging for children to implement on their own, but parent-initiated distraction downregulates the distress of children [69,80], and toddlers attempt these strategies more often when an adult is present who can help to reinforce their attentional redeployment [81]. In such cases, the social regulation of emotion reinforces self-regulation by the target, effectively scaffolding or supplementing [5] rather than replacing the target's control efforts.

Attentional deployment may be most effective when initiated proactively [82], before emotional responses of others have fully bloomed. Mothers who anticipate that running errands will tax their children's patience may choose to actively distract and entertain their children throughout the experience [80], thereby lessening the distress of their children, compared to mothers who defer regulation until their children become upset. Moreover, waiting until children become distressed to implement social regulation reinforces the rapid escalation of emotion and interferes with the children's ability to self-regulate (self-regulation is more difficult when experiencing strong feelings) [17,19,83].

Cognitive Change

Regulators can change the way targets cognitively interpret the meaning of emotionally evocative stimuli, altering their subsequent affective response. Cognitive change offers a way to manage emotions while still engaging targets with the elicitor, which is important when the stimulus must be approached (e.g., an exam) or cannot be avoided (e.g., bodily sensations [84–87]). Of the myriad ways that one could change the interpretation of the meaning of a stimulus, reappraisal has received the most empirical attention.

Social reappraisal involves offering targets alternative interpretations for emotionally evocative stimuli. In the example of the man arguing with his friend, the wife may suggest alternative interpretations of the friend's actions that diffuse her husband's negative emotions. Such examples of effective social reappraisal are found across a broad range of contexts. In organizations, managers and supervisors are well-positioned to reframe experiences for others or interrupt their negative interpretations of circumstances [63,88], thereby increasing the extent to which those employees trust them [8]. Customer service representatives can use similar reframes to diminish customers' negative affect and increase their positive affect [89]. In parenting contexts, the use of strategies designed to help children to identify and resolve the source of their distress is positively correlated with children's coping and social functioning [90]. Furthermore, in laboratory contexts there are numerous findings showing that manipulating beliefs about the nature of stimuli – for example, by providing descriptive captions or labels – has regulatory effects. For instance, neutral captions for aversive images reduce self-reports and event-related potential (ERP) indices of negative affect [91], labeling a surprised face as fearful increases amygdala activity [92], telling someone they are tasting expensive versus cheap wine modulates preferences and activation in striatal and ventromedial prefrontal reward regions [93], broth is tastier when labeled as rich instead of bland [94], and a scent labeled 'cheddar cheese' versus 'body odor' is judged to be more pleasant and diminishes disgust-related neural activity [95].

Response Modulation

Outward expressions of emotion – whether they are changes in facial expression, vocal tone, or other behaviors – are highly-salient aspects of one's emotional experience for others, and response modulation involves controlling them. In the example of the man arguing with his friend, his wife might engage in injunctive control by instructing him to behave differently (e.g., telling him to relax). Threatening contexts and intense negative emotions are more likely to lead people to select response modulation compared to other strategies, either when managing their own reactions [96] or those of other people [89]. This tendency to deploy response modulation may be related to attributions the regulator makes regarding the source of the reaction. Akin to the fundamental attribution error [97,98], regulators may be more likely to ascribe strong emotional reactions to features of the individual displaying them as opposed to recognizing how aspects of the situation mold those reactions. Negative mood states also tend to focus attention [99,100], and therefore in cases where the target's response generates negative affect for the regulator, they may be more likely to hone their attention on the response of the target and neglect the external context. These attributions may prompt regulators to thus select a strategy that is most closely linked to the expression – response modulation – as opposed to targeting a different phase in the emotion-generation response.

Social Regulation from the Perspective of the Target

In the SRC (Figure 2), targets engage a sequence of processing steps to generate the emotional response that in turn initiates their dynamic interplay with regulators. Because this emotion-generation sequence has been well-studied and described elsewhere [1], we will discuss its elements briefly and focus on ways in which emotion generation differs in the context of social regulation as compared to self-regulation. Perhaps the most important differences revolve around how targets attend to and interpret the regulator's attempts to modify their emotions, which is shaped in part by the relationship between the two parties (Box 2). While we discuss these interpretations in greatest depth in the Appraisals section, they modulate social regulation at each stage of the emotion-generation process.

Situation and Elicitor

The target's cycle begins with elicitors in the environment that trigger emotion. Research typically focuses on external elicitors, but stimuli could be internal (e.g., the sensation that one's heart is

Box 2. The Relationship Context of Social Regulation

By definition, the social regulation of emotion occurs within a relationship context which moderates both the probability that regulators will engage in emotion management as well as the targets' response to attempted regulation. Relationships generally can be classified as communal or exchange [126]. Communal relationships are characterized by concern for others' welfare whereas exchange relationships tend to be predominantly transactional in nature. Emotion expression is more likely in communal relationships [127,128], offering regulators enhanced insight into targets' current emotional state. This insight may explain in part why regulators are more likely to offer support in communal relationships [129,130] because they are better able to identify deviations between the current and goal emotional states of the target. Although social emotion regulation is more likely in communal relationships [130], it has been documented in exchange environments [89,131–135]. Thus, communal interpersonal contexts may encourage social emotion regulation, but they are not a necessary precondition.

In some circumstances, however, such as with casual acquaintances or coworkers, it may not always be clear whether a relationship is communal or not. In ambiguous relational contexts, people's sensitivity to diagnostic information about the relationship and their counterpart's motivations is heightened [136] and they become more receptive to benevolent actions. In these circumstances, target attributions about regulator actions may be more important, and interpersonal emotion-regulation attempts may build trust when they are interpreted as arising from a concern for the benefit of the target [10]. Such effects have been documented even in low-trust environments, such as prisons. Guards and prisoners who attempt to improve the emotional states of each other become more likely to view their relationship with the target as communal and become more likely to trust the target [9]. Importantly, these attempts also lead the target to view the regulator as a friend and become more likely to trust the regulator, even in cases where they occupy a different role (i.e., prisoner or guard) [9]. Similar processes have been hypothesized to extend beyond individuals and enhance intergroup or inter-organizational relationships [10]. Conversely, if the target perceives regulatory attempts as signaling that the regulator does not care about the feelings of the target, this may lead to both detrimental emotional responding and diminishing interpersonal trust [8,89]. Thus, when targets perceive regulatory attempts as arising from self-serving motives or negative judgments they may actually backfire, both failing to improve the affect of the target and resulting in long-term negative outcomes for the relationship.

racing [87]). External elicitors are key for social regulation in two ways. First, the regulator's presence modifies the environment and presents a new stimulus for the target. Social baseline theory explains this by positing that people perform optimally in the presence of familiar others because their presence increases joint resources, distributes risk across multiple actors, and increases individuals' perceptions of the efficacy of their own actions [101,102]. Thus, social regulators may find that their mere presence improves the target's emotional responding. Second, the regulator's actions could be the emotional trigger that initiates the regulatory cycle [7], such as when we attempt to quell another person's distress after we have wronged them.

Socially implemented situation modification may regulate the emotion of the target, but it can create challenges in the future if the target interprets the support as a solution in and of itself rather than one that enables their own self-regulatory efforts. The best examples of such inappropriate reinforcement come from the developmental literature, such as where children learn that emotion expression mobilizes the control systems of the parents to rectify the situation. For example, granting a child's wish for a toy during a tantrum may make them more likely to express negative emotion and less likely to self-regulate when they are older [69]. The target's mental associations between their expressions and the actions of the regulator can therefore reinforce behaviors that are undesirable in the future.

Attention

Attention is often described as the selective aspect of processing, and whether and how long one attends to an emotionally evocative stimulus can impact the intensity of one's response to it. In the context of social regulation, the key attentional question is whether the target notices the regulator's actions. When targets perceive attempted social regulation, they may experience reactance. In romantic couples, attempts to regulate a spouse's emotions may become an emotional trigger itself when it signals that the target's emotional responding is inappropriate [7]. In organizational contexts, supervisors attempting to modify the emotional responses of their employees, or customer service representatives trying to manage the emotions of their customers, are sometimes viewed negatively by their targets and may actually increase the negative

emotional experience of the target [8,89]. Backlash arises when targets do not view regulators as being able to legitimately identify appropriate goal emotional states for them or when they disagree with the goal state identified [89]. In such circumstances, social regulation may be most effective when it is less visible [28,64] and therefore less likely that targets become aware of it.

Appraisal

Appraisals are interpretations of the meaning of stimuli and they influence the emotions elicited. Primary appraisals evaluate the relevance of a stimulus to one's goals and secondary appraisals evaluate one's ability to cope with the stimulus [12,87,103]. In the SRC, appraisals arise in two main ways: how the target judges their own coping abilities, and how they interpret the social regulator's motivations.

With respect to how targets view their own abilities, the mere presence of a prosocial other can increase their own perceived self-efficacy [101,102] and diminish distress. Neuroscientific research demonstrates that the presence of a close other diminishes negative affect without recruiting activation in lateral prefrontal regions associated with effortful control [75], consistent with the assertion of the social baseline theory that the presence of others reduces demands on the self-regulatory resources of the target [102]. However, targets may perceive social regulatory attempts as reflecting the belief of the regulator that they are unable to manage their own emotions capably. Such perceptions undermine the sense of self-efficacy of the target and potentially undermine social regulatory attempts. Decreasing the visibility of social regulatory attempts limits these negative consequences. For example, in an experience-sampling study of law students studying for the bar exam and their spouses, students experienced the greatest emotional benefits when partners provided social support the students did not notice, such as taking care of household chores, offering advice, or providing needed distraction [28]. These forms of invisible support mitigated stress among students without generating doubts about their own capacity to cope with stressors. Similarly, advice aimed at minimizing a target's distress during a social stressor was most effective when it was not perceived as a judgment that the target needed assistance [64]. These findings suggest that social regulation may be most effective when targets do not realize they are being regulated.

Target appraisals also color how they interpret the motivations of regulators for engaging in social regulation in two main ways. First, targets may attribute nefarious motives to the regulator. For example, if targets view social regulatory strategies as calculated attempts to manipulate them, as in 'good cop–bad cop' interactions [104], the strategy may not only prove ineffective at altering the target's emotion but may instead trigger interpersonal conflict. Second, targets may doubt the authenticity of the regulators' prosocial actions, particularly when the target solicits

Box 3. Outcomes Associated with the Social Regulation of Emotion

Understanding what mechanisms lead to the full range of possible social regulatory outcomes is very important, given that it can have numerous benefits for both the regulator and the target, including: building self-regulatory capacity for both of them ([69,137], B.P. Dore *et al.* unpublished), de-escalating conflict and increasing relationship satisfaction [138], and lessening negative and enhancing positive emotion [9,139], which in turn may reinforce and improve social bonds [140] and build trust both between individuals [128,141] and groups [10]. In the SRC, whether a given instance of social regulation proves beneficial or detrimental for regulators and targets depends on how the regulatory cycle unfolds. For instance, a given attempt to change the emotions of the target could go awry because the regulator misidentifies his/her emotions, sets misguided regulatory goals, selects inappropriate strategies, or implements their strategy ineffectively. For their part, the actions of the target could derail regulation because they misapprehend the intentions of the regulator towards them, or because their emotional responses do not clearly communicate their true regulatory needs. This review has highlighted a few such examples, including that social regulation appears to be most effective when it alters early stages in the emotion-generation process of the target, such as modifying the situation or changing the target's appraisal of the elicitor, and that strategies that are less visible or are perceived as more benevolent likely produce the most desirable impact on the target's emotional state. Further work will be necessary to unpack the mechanisms underlying the full range of possible social regulatory outcomes.

Box 4. Clinical and Organizational Applications of the Social Regulatory Cycle

Future work examining the social regulation of emotion will likely inform practice in several contexts outside the laboratory. While many applications of the SRC could prove useful, we highlight two key domains where insights about social regulation are likely to have an impact. The first is the clinical domain, where the SRC may be informative about both dysfunction and treatment. With respect to dysfunction, the SRC offers a means to explain how attempts at social regulation can go awry at any of multiple stages for both regulators and targets, and as such could provide a model for understanding key aspects of marital dysfunction, abusive relationships, and psychiatric populations characterized by dysfunctional relationships and interpersonal behavior more generally, such as borderline personality and social anxiety disorders [142,143]. With respect to treatment, the SRC offers a means to explain how attempts at social regulation can go well, and as such could provide a model for various kinds of psychotherapeutic interventions, where the therapist is the regulator attempting to impact on the emotions of a target patient [144]. The second domain is organizations, where interpersonal and inter-organizational interactions are important to both individual and institutional outcomes. Social regulation may change when conducted not within a dyad but in larger groups [7], as when a leader coaches a team. Organizational contexts allow the examination of such complex relational structures while also offering insight into how other factors impact social regulation, such as power hierarchies and relational histories [145]. Future work could investigate how added social complexity may complicate both empathic and inferential processes that support social regulation, potentially altering both the probability that regulation will be attempted as well as its likely outcome.

Outstanding Questions

How does the self-regulation of emotion interact with the social regulation of emotion? To what extent must social regulators of emotion also engage in self-regulation?

How does social regulation change when the target and the regulator have different goals for the target's emotional state?

What neural mechanisms underlie the SRC, particularly for regulators?

How does dysfunctional social regulation contribute to the etiology and maintenance of psychiatric and clinical disorders, and how can an understanding of social regulation be useful in treating them?

Moving beyond dyads, how does the social regulation of emotion unfold in complex social groups, structures, and organizations?

regulatory assistance. Requesting social regulation makes the target feel vulnerable and leads to doubts about the intentions of the regulator [105,106]. In the context of cognitive change, if regulators offer alternative interpretations or new facts to the target to improve their emotional state, the information they provide is often viewed as unreliable and their attempts are perceived as inauthentic [105,106]. Under such circumstances, both the target's emotional state and the relationship between the target and the regulator may be negatively impacted.

Response

Controlling the behavioral expression of emotion is known as response modulation. In the context of social regulation, target responses play two types of roles. First, targets may engage in strategic emotion expression, augmenting the expression of genuine emotion or displaying inauthentic emotions to elicit desired responses from regulators. For instance, children may ape negative emotions to elicit bribes from their parents, and negotiators may overexpress negative emotions to extract concessions from others [107–110]. The second concerns the effects of social response modulation. Self-directed response modulation is effective at changing outward emotion expressions but does little to alter one's emotional experience, diminishes attention to and memory for external stimuli, and increases physiological arousal for the self and others [111–113]. Similar costs are attendant to social response modulation, which frequently has been shown to be ineffective and is the social regulatory strategy most likely to be detrimental for the target. For example, customer service representatives who attempt social response modulation (e.g., 'try to relax') evoke even more negative emotions in their customers [89]. Parental minimizing of children's distress may limit immediate emotional expression but in the long run lead to aggravated responses and decreased social competence [36]. In this way, minimizing or punishing expressive behavior may teach children that emotions are distasteful, making them less likely to acknowledge their feelings or explore their antecedents in the future, and increasing avoidant coping [36,90]. As with other processing stages, target interpretations of the meaning of regulator's reactions to their emotional expressions shapes both the effectiveness of the regulatory attempt as well as their future behaviors.

Concluding Remarks and Future Directions

Drawing on research from multiple fields, the present review proposes an integrative and comprehensive framework of the social regulation of emotion that can organize and guide behavioral and neuroscience research. This working framework posits a dynamic, interactive SRC as a model of the social regulation of emotion. The value of the SRC derives in part from the common language and reference frame it provides for multiple disciplines – ranging from developmental, social, and organizational psychology to various areas of neuroscience – to

develop theories about and empirically investigate related phenomena. Although the proposed SRC is somewhat preliminary given the current state of interdisciplinary research in this field, it is precisely at early stages of research that highlighting opportunities for cross-disciplinary integration can be most valuable. In principle, this integrated approach could address myriad questions about the mechanisms described in the SRC and the outcomes they produce (Box 3) across a range of applications (Box 4). Practical considerations, however, limit us to highlighting three main directions for future research (see Outstanding Questions).

Our review began with a comparison between self-regulation and social regulation, and future work could seek to understand their interplay. For example, to socially regulate, regulators first may need to effectively self-regulate (Box 1), as when wives who downregulate their own negative emotions subsequently engage in more conflict resolution and both they and their spouses report higher marital satisfaction [35]. Conversely, diminished ability to regulate one's own emotions can lead to negative interpersonal behaviors such as domestic abuse [114]. Future work should examine the hypothesis that escaping one's own negative affect or maladaptive emotion regulatory cycle may position a regulator to more easily embrace adaptive interpersonal strategies.

A second question concerns the range of social regulatory phenomena studied. To date, most research has focused on affiliative relationships in which both the target and the regulator generally want one another to experience more positive and less negative emotion, such as parental, marital, and clinical relationships. While it is possible that similar processes support social regulation in more competitive contexts, future research should examine such attempts to assess points of convergence and divergence.

A third question concerns the neural bases of the processes supporting social regulation. As noted earlier, most knowledge about these systems comes from related research on self-regulation and person perception, as well as from the handful of studies demonstrating the impact of social regulation on the affective appraisal and response systems of targets. Imaging studies of the neural systems engaged by regulators at every step of the cycle will be an important direction for future research.

In sum, research on the social regulation of emotion is gaining enhanced attention from multiple research communities, and this growing Zeitgeist comes at an opportune time as fields once concerned largely with individuals, ranging from cognitive neuroscience to the study of organizational behavior, begin to consider dynamic social interactions [115–117], networks, and subcommunities [118]. This increased focus on social relationships as the unit of analysis will likely promote advances in understanding social regulatory phenomena. This is important because insights into the mechanisms that guide social regulation have the potential to inform clinical practice, assuage social conflicts, and inform the design of management practices. The authors are hopeful that progress in this area will not only provide predictive insight into fundamental social and affective mechanisms but will also inform relevant applications, from the boardroom to the clinic.

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