Research Methods in Emotion Regulation

EVOLVING QUESTIONS AND NEW APPROACHES

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How we cope with difficult emotions has long been of scientific interest, but it wasn't until the early 1990s that emotion regulation truly took flight as a specific research area. Since then, the field has grown exponentially. Initially, researchers studied the efficacy of specific regulation strategies in laboratory settings, but over time it became clear that emotion regulation is a multifaceted process that involves complex interactions between numerous personal, situational, and strategic factors. Today, the field has moved away from the goal of identifying adaptive versus maladaptive strategies and toward investigating regulation as a dynamic open-ended process (Bonanno & Burton, 2013; Doré et al., 2017). Critically, as the questions posed in experiments have evolved, so too have the methodological approaches used to address them.

With this in mind, our chapter has three parts. First, we highlight the broadening scope of questions asked in the field of emotion regulation, coming ever closer to finding the "holy grail" of emotion regulation work: the elusive ability to specify what strategy is most effective for a specific person in a specific situation. Second, we survey methodological developments that have helped address these evolving questions, with a special emphasis on the social context in which regulation takes place. Third and last, we highlight potential future directions for the methods used to study emotion regulation.

Evolving Questions: Person × Situation × Strategy Interactions Matter

The questions driving emotion regulation research have gradually evolved amid growing recognition that heterogeneity in data is the norm rather than the exception in both laboratory and naturalistic studies. Although not all humans respond the same way to an

external event, historically, researchers treated such heterogeneity as noise masking true effects that need to be uncovered (Bolger & Zee, 2019). This focus on main effects above interactions has created confusion, contributed to the replicability crisis, and diminished confidence in the field's potential to inform public policy in a meaningful way (Pashler & Wagenmakers, 2012).

Reacting to these limitations, the last decade has seen a "heterogeneity revolution" (Bryan et al., 2021) that challenges researchers to begin with the assumption that most effects *should* depend on the characteristics of the people and contexts in which they are studied. *If* we accept this premise, then our focus can change to understanding *how* effects vary across people and contexts instead of attempting to discover universal principles.

The question of heterogeneity is particularly important to the field of emotion regulation, where theoretical models have long acknowledged "the fallacy of uniform efficacy," emphasizing that the outcomes of regulation are likely to depend on the individual and situation in which regulation takes place (Bonanno & Burton, 2013; Troy et al., 2017). A regulation strategy that works in one context might not in another. In the spirit of the "heterogeneity revolution," our lab proposed a model framing emotion regulation as a person × situation × strategy interaction (Doré et al., 2016). We think of the ability to specify "for whom, and under what circumstances, will different strategies be most beneficial and why" as the "holy grail" of emotion regulation research.

New Approaches to Studying Person × Situation × Strategy Interactions

Evolving questions require evolving methods to address them. This section highlights studies incorporating new measures and methods to study emotion regulation as a person × situation × strategy interaction. While it is beyond the scope of this chapter to survey all person, situation, and strategy variables that are—or could be—investigated, Table 2.1 summarizes some common examples that can be measured and/or manipulated in a given study.

Studying the Self-Regulation of Emotion

The lion's share of studies has focused on how individuals exert self-control over their own emotions, typically in lab-based behavioral studies, although field and functional imaging studies are becoming increasingly common. We consider each in turn.

Lab-Based Behavioral Studies

Lab paradigms have begun to pose new questions about the interaction of person, situation, and strategy variables. Critical to this evolution was the realization that by instructing participants when and with what strategy to regulate, lab studies had been missing a common and essential regulatory dilemma: the question of what strategy to choose given our current situation. Spurred by this insight, Sheppes et al. (2011) gave participants the choice to use reappraisal or distraction when responding to aversive stimuli of varying intensity. They found that reappraisal was preferred for low-intensity stimuli and distraction for high-intensity stimuli. This finding pushed the field to consider how the usefulness of any regulation strategy varies by the situation (Troy et al., 2013), and

TABLE 2.1. Examples of Person, Situation, and Strategy Variables Studied in Emotion Regulation Research

Person	×	Situation	×	Strategy
Cellular/molecular-level variables, including genetics, receptors, neurotransmitters, hormones		Kinds of emotion-eliciting stimuli		Manipulate or measure regulatory goals
Differences in life events, socialization, and learning histories, trauma, or stress exposure		Frequency of occurrence (e.g., isolated vs. recurrent)		Manipulate or measure strategies chosen
Structural/functional measure of the maturation and integrity of brain systems		Self versus social (e.g., alone vs. being in the presence of, touching, and/or interacting with one or more individuals)		Manipulate or measure timing of strategy implementation
Structural/functional measures of relevant physiological systems (e.g., hypothalamus–pituitary–adrenal axis; sympathetic/parasympathetic function)		If social, the relationship between self and others (e.g., close vs. distant)		Manipulate or measure frequency of strategy implementation, including practice and training
Whole-person descriptors, including age, personality traits, chronic behavioral/emotional tendencies, clinical diagnoses		If social, the behavioral context (e.g., support conversation, group interaction)		Measure downstream effects of strategy implementation on emotion, behavior, relationships, etc.

Note. This table lists examples of person, situation, and strategy variables that are being studied in current emotion regulation research. After an initial wave of studies primarily focusing on one variable type at a time (e.g., comparing the effects of using different types of strategies, how well clinical vs. control groups can use a specific strategy), more recent work has moved toward studying interactions among these variables (e.g., asking how different strategies are most appropriate for different situations). From a methods perspective, a key question is how to design studies that capture these interactions in a tractable and reliable way.

provided a means of defining new personal-level variables, such as regulatory flexibility, which indexes a person's tendency to switch between strategies (e.g., distraction vs. reappraisal) across situations. Armed with such new approaches, scientists can ask new questions and reexamine issues of long-standing interest. For example, Levy-Gigi et al. (2016) took a "person × situation" approach to studying resilience and showed that in firefighters, symptoms of posttraumatic stress disorder (PTSD) were more likely to emerge after trauma exposure for individuals low in regulatory flexibility. Beyond this work, various other person-level variables—and their interactions with situational and/or strategic variables—can and are being investigated. Some variables can also be derived from task performance, such as responsiveness to internal feedback (Birk & Bonanno, 2016), or studies might focus on demographics known to influence affective and cognitive development, such as age (Silvers et al., 2012) and socioeconomic status (Troy et al., 2017).

Field Research

Another heterogeneity-focused trend involves testing concepts and relationships established in laboratory experiments in ecologically valid field settings, where participants can freely choose strategies in response to different everyday situations. This allows researchers to ask *who* selects *what* strategies in *which* situations, and furthermore, to track the

impact these strategies have on the ebb and flow of emotions in everyday life (Blanke et al., 2022). The canonical paradigm for such studies is experience sampling or ecological momentary assessment (EMA), which typically uses smartphone-based queries to probe emotional experiences in the moment, thereby avoiding biases associated with memory recall (Barrett & Barrett, 2001). Surveys can be sent to participants' phones at fixed or varying intervals over very short (minutes) or longer periods of time (days), depending on the question of interest.

The detailed information on regulation choices provided by EMA can help build individualized regulation profiles. For example, Grommisch et al. (2020) used multilevel latent profile analysis of EMA data to identify five individual difference profiles varying in the tendency to deploy 10 different emotion regulation strategies. Although these researchers did not assess the situational dependency of strategy deployment, or the role of other person-level variables, it sets the stage for future work to address these interactions.

Functional Imaging

Over the past 20 years functional magnetic resonance imaging (fMRI) has begun to elucidate the neural underpinnings of emotion regulation. In a typical study, participants use one or more strategies to modulate emotional responses to stimuli on a trial-by-trial basis (Ochsner et al., 2012). While early studies aimed to understand how prefrontal regions modulate activity in regions associated with affective responding (e.g., amygdala), more recent studies have focused on interactions between distributed neural networks (Seeley et al., 2015).

Most germane to the present chapter, fMRI studies are also starting to examine how situation (e.g., mild vs. intense International Affective Picture System photos) or person (e.g., healthy vs. clinical participants) variables interact with strategy (e.g., reappraisal vs. distancing) choices to predict regulatory success at both the behavioral and neural levels (Kanske et al., 2015).

Another exciting development is the use of alternative imaging technologies, such as functional near-infrared spectroscopy (fNIRS). Although fNIRS provides lower-depth penetration than fMRI, it has better time resolution, is portable, and is relatively easy to use (Dieffenbach et al., 2021). Because it doesn't involve lying in a narrow tube and tolerating the sudden and loud noises made by an fMRI scanner, it may be better tolerated by vulnerable populations, including children and those with anxiety or trauma exposure. For example, Balters et al. (2021) used fNIRS responses to fearful and neutral faces to identify a neural biomarker of PTSD symptom severity in trauma-exposed youth. More generally, the portability and relative simplicity of fNIRS may prove especially useful for studying groups that, for geographic, socioeconomic, or clinical reasons, can't or won't come to a centralized fMRI facility.

Studying the Social Context of Emotion Regulation

In the past decade, researchers have also begun to pay more attention to the social aspects of emotion regulation, including (1) how the presence of others impacts the way we self-regulate our emotions, and (2) how we regulate the emotions of our interaction partners. In a person × situation × strategy interaction framework, we can think of other people as the situational variables with which our own individual differences and strategy choices interact.

Self-Regulation in Social Contexts

Both lab and EMA methods have been used to investigate how—and to what effect—people implement self-regulation strategies in the presence of other people.

LAB-BASED BEHAVIORAL STUDIES

Most behavioral studies, conducted in lab settings, seek to understand the personal and social impacts of using a specific strategy (e.g., reappraisal, suppression) while one has a conversation about a neutral versus upsetting versus happy topic with another person (e.g., stranger vs. relationship partner). Outcomes of interest for regulators and their partners include self-reported emotions and feelings of closeness, expressive behavior and physiology, and intimacy as exemplified by touch (Butler et al., 2003; Peters & Jamieson, 2016).

FIELD RESEARCH

While laboratory studies help identify key social consequences of different strategies, they tell us little about when, how, and why people choose to regulate in social settings. Initial studies have used EMA to document how often adults use particular self-regulation strategies when interacting with close versus distant others (Benson et al., 2019), as a function of the amount of social support received from others (Pauw et al., 2022), and how effective self-regulation is at diminishing negative affect when one is alone versus in a particular social setting (Stone et al., 2019). Future work could build on these findings by asking, for example, what situations/interactions motivate the use of specific regulatory social-regulatory strategies.

FUNCTIONAL IMAGING

For years, imaging studies have investigated the neural systems underlying affective responses to social interactions involving trust, cooperation, and inclusion/exclusion. Only recently, however, has imaging work begun to study how individuals are motivated to self-regulate their emotions in these situations. Perhaps the simplest approach focuses on one variable—for example, person-level differences in the use of a strategy like mindfulness—and relates it to the engagement of brain systems for generating and regulating social emotions like rejection (Martelli et al., 2018). More complex approaches explore person/situation/strategy interactions in the scanner by instructing different participant groups (e.g., healthy vs. depressed individuals) to deploy prespecified strategies (e.g., reappraisal, acceptance) to regulate the responses (e.g., exclusion vs. inclusion) elicited by different social situations (e.g., Cyberball, social judgment, chatroom; Platt et al., 2015). This area of research is in its relative infancy, but holds great promise for clarifying how we engage neural networks for emotion and control in response to the presence and actions of others.

Social Regulation

In addition to recognizing that we often regulate our own emotions in social contexts (English et al., 2017), attention is turning to studying the ways our emotions can be regulated by other people in social interactions (Zaki & Williams, 2013). While *self-regulation*

refers to an individual's efforts to modify their own emotions, *social regulation* refers to one person's (the regulator) deliberate attempts to change the emotional response of another person (the target; Reeck et al., 2016).

LAB-BASED BEHAVIORAL STUDIES

The majority of social regulation studies have focused on the target, asking how different types of social regulation impact their emotions. Perhaps the simplest examples come from a hand-holding paradigm that offers myriad options for studying how one's physical proximity—and relationship—to another person impacts responses to an aversive stimulus (Coan & Sbarra, 2015). Methods for studying self-regulation strategies are also being adapted for studying social regulation. For example, Sahi et al. (2021) adapted a commonly used reappraisal task to ask whether self-generated reappraisals, versus listening to a friend reading reappraisals generated by the researchers, were more helpful in reducing negative affect.

Recent studies have also begun studying how regulators select and/or implement strategies to regulate others' emotions. In such studies, participants are provided with short descriptions of negative events provided either by friends (Marigold et al., 2014), online samples (Shu et al., 2021), or confederates (Sahi et al., 2022) and are then asked to offer written support. This design allows researchers to manipulate features of targets (e.g., self-esteem), the eliciting event/emotion (e.g., anxiety vs. sadness), or the strategy used (e.g., validation vs. reappraisal) to investigate how each of these factors influences the effectiveness of social regulation.

FIELD STUDIES

Daily diary and EMA methods have been used to investigate how romantic couples, parents and children, friends, and even families influence one another's emotions in daily life. Advancements in multilevel modeling for dyads, such as actor–partner interdependence, dynamic structural equation modeling, and multilevel vector autoregressive network modeling, have allowed researchers to use intensive repeated measures from two or more actors to understand how people causally influence one another's emotions in daily life. Additionally, field studies can be supplemented with sensing technology, such as miniaturized microphones, video cameras, or electrocardiographic sensors, to richly characterize emotion-eliciting situations and responses (Smith et al., 2022).

Social regulation is also being studied by adapting/adopting internet-based platforms that facilitate repeated interactions among multiple individuals in larger groups. For instance, Doré et al. (2017) used an online platform where users could share negative experiences, as well as write supportive responses using acceptance or reappraisal. This design allowed situations and resulting emotions to vary freely, but constrained the strategies participants could use for social regulation.

FUNCTIONAL IMAGING

Functional imaging work on social regulation is just beginning. To date, a few fMRI studies have adapted behavioral paradigms for studying social proximity effects (Beckes et al., 2021), but no studies have examined social regulation in a conversational or interactive context. Hyperscanning, which simultaneously collects fMRI or electroencephalogram (EEG) data from two or more people in social interactions, hold promise for

future work. Although the interpretation of brain-to-brain patterns of coherence remains a topic of debate, recent advancements in engineering and analytical tools are encouraging. Hirata et al. (2014), for instance, developed a promising magnetoencephalography (MEG) hyperscanning system for studying brain-to-brain mother–child interactions.

Conclusions and Future Directions

In this chapter, we tried to illustrate what we think is a fundamental, yet sometimes overlooked aspect of research methods—namely, that depending on the question you ask, different methods must be used to obtain the answer. In the last decade, the science of emotion regulation has moved away from studying the main effects of strategy implementation and toward exploring the interdependence of individual, situational, and strategic factors. As a consequence, new paradigms have been needed to add nuance to our understanding of when, for whom, and how specific emotion regulation strategies influence individual and social well-being. But the day is still young for the systematic study of emotion regulation, and new areas of discovery are always on the horizon. Over the next decade, we expect advances on many fronts, ranging from novel ways to study how regulatory processes shape the temporal ebb and flow of emotional states in daily life to leveraging the growing use of mobile sensing equipment to chart previously unknown situation and strategy-dependent changes in these states. We can't wait to see what's next.

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