Emotion Regulation
Concepts & Practice in Autism Spectrum Disorder

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KEYWORDS

• Emotion regulation • Autism spectrum disorder • Therapy • Behavioral problems • Review

KEY POINTS

- Emotion regulation (ER) involves modulating the temporal features, intensity, or valence of one's emotions in the service of adaptive or goal-directed behavior.
- Disrupted ER may be inherent in autism spectrum disorder (ASD).
- Impaired ER may be a more parsimonious explanation than psychiatric comorbidity for severe behavioral disturbances observed in ASD.
- Few interventions have been developed to explicitly target ER processes in ASD.
- ER may be addressed (even if not labeled as such) in some existing psychosocial treatments used in ASD, including the provision of positive behavioral supports, enhancing emotional language, and modified cognitive–behavioral therapy.
- Areas of future need include the development and validation of measures to assess ER in ASD for treatment planning and evaluation purposes, as well as the development of interventions to promote ER that incorporate the unique characteristics of ASD.

INTRODUCTION
Emotion Regulation Concepts

Imagine that you are driving to work, and someone cuts you off. Your heart rate rapidly increases, and you experience a wave of intense irritation, yet you manage to blare on your horn, simultaneously hit your brakes, and remain focused on safely driving. You have just engaged in effective emotion regulation (ER), which broadly encompasses the processes related to modifying one' emotions to fit the context or meet one's goals[1,2] (in this case, staying safe). Although the distinction is widely debated,[3–5] emotion regulation differs from the experience of emotion itself, in that ER involves an attempt to modify the intensity or temporal features of an emotion (eg, after the

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initial startle when you are cut off, you quickly experience anger when you see the driver texting [emotion], but, you attempt to keep the anger from escalating so that you can remain focused on safely driving [ER]). ER processes can occur at the unconscious level (without realizing you are doing so, you maintain a level of fear that will keep you alert but not unable to act) and at a conscious level (eg, telling yourself you are okay after the incident is over). Further, ER can be response-focused as in this example, or antecedent-focused (prior to the emotion).

Most people have a characteristic and fairly stable ER style. A person's customary ER style can be generally adaptive or maladaptive, with the latter often associated with psychopathology and less appropriate behavior. Disrupted, or maladaptive, ER has been implicated as a mechanism underlying various psychiatric disorders, including depressive[6,7] and anxiety[8] disorders and borderline personality disorder.[9] Thus, poor ER is a transdiagnostic process that plays a role in many disorders in producing inappropriate emotional and behavioral reactions. The mechanisms that give rise to emotional dysregulation and how ER manifests itself, however, are more disorder-specific.[9]

Role of ER in Autism Spectrum Disorder

Although much less studied in autism spectrum disorder (ASD) than in other psychiatric disorders, disrupted ER is likely to be a significant factor in producing aberrant behavior in ASD as well.[10,11] One likely manifestation of ER failure in ASD is serious behavioral disturbance. Tantrums, uncontrolled outbursts, aggression, and self-injury are often interpreted as defiant or deliberate. Although this interpretation is likely accurate in some circumstances, it is more often the case that these inappropriate behavioral reactions stem from ineffective management of emotional states in response to stress or overstimulation.[12]

Absent or impaired ER may be a more parsimonious explanation of serious behavioral disturbance in ASD than psychiatric comorbidity. Psychiatric diagnoses are difficult to reliably make in ASD for a variety of reasons, including lack of measures validated for use with this population, difficulty assessing certain symptoms in nonverbal individuals, inadequate insight and poor temporal reporting, unique manifestations of distress in ASD, and the challenges involved in interpreting and differentiating symptoms that could be attributed to ASD or a secondary disorder (eg, lack of positive affect as part of ASD or because of depression).[13,14] For all of these reasons, there is growing concern that psychiatric diagnoses may be overused in ASD.[15] Many secondary psychiatric problems may be more accurately conceptualized as part of the ASD itself or may stem from a fundamental problem in ER.[10]

ASD-Related Factors that Impede Effective ER

Many characteristics of ASD may interfere with effective ER (**Fig. 1**).[16] First, alexithymia, or difficulty identifying, distinguishing, and describing emotions, has been well documented in ASD.[17–19] Although not essential for all forms of ER, recognizing and understanding one's own emotions is necessary for effortful ER.[20] Labeling of one's emotion has been proposed as critical to successful ER,[21] and being able to communicate to others about one's emotional state is also involved in interpersonal ER aspects, such as joint problem solving or sharing of one's emotions. Given that language competence is associated with emotional competence in typical development,[22] it is also conceivable that the language and communication impairments common in ASD affect development or regulatory abilities.

As proposed by Samson, Huber, and Gross,[23] core deficits in theory of mind, or ability to take others' perspectives cognitively and effectively and to recognize one's own state of mind, may be related to poor ER. Some regulatory strategies

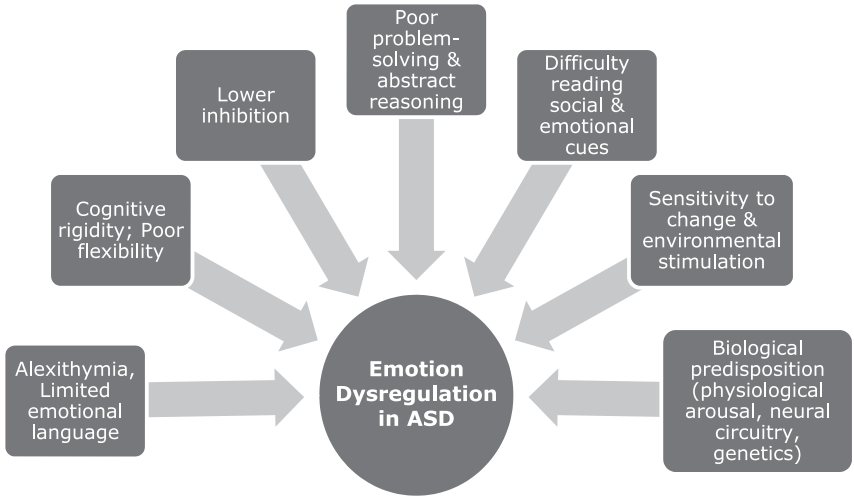

Fig. 1. Characteristics of ASD that may contribute to emotion dysregulation.

(eg, intentionally changing one's cognitive frame or perspective) are inherently related to perspective-taking ability. The social and cognitive deficits that define ASD also create ER challenges, particularly given that adaptive ER is context-dependent and requires one to be able to accurately identify critical aspects of the situation.[10] Even among cognitively higher-functioning individuals with ASD, there are deficits in the processing and integration of complex information.[24] Children with ASD may focus on the wrong information or misinterpret others' intentions because of failures in perspective taking and lack of appreciation of others' perceptions and experiences (eg, theory of mind deficits),[25] which could increase frustration. Difficulty accurately perceiving others' social and emotional cues may also interfere with the timing and implementation of effortful ER strategies. Impulsivity and impaired inhibition, which are present in as many as 50% of children with ASD,[26] could similarly interfere with ER. Specifically, even if the child knows what he or she should do when upset (eg, take deep breaths), inability to inhibit the more potent and automatic response (eg, hitting and yelling) could result in ineffective ER. If a child with ASD does stop to think about the situation before reacting, the tendency to be rigid and engage black-and-white thinking may still preclude a flexible and adaptive ER response.[10] Even on structured neuropsychological tests in laboratory settings (which are slower and more straightforward than the fast-moving interactions that require ER in daily life), problem-solving deficits in ASD have been documented.[24]

Finally, children with ASD may be predisposed to problems with emotional control given differences in arousal and underlying neural circuitry. Children with ASD are known to have unusual reactions to sensory information and are often sensitive to change. These differences in responses to the environment may increase reactivity and lability.[27] Further, although results are not entirely consistent, there is evidence to suggest that at least some of the ASD population is physiologically hyperaroused,[28] particularly those who present with anxiety symptoms. Additionally, although neuroimaging research on ER in ASD is limited, there is evidence that the neural structures implicated in ER in other populations differ in ASD either in function, size, or circuitry with other parts of the brain.[29–31] Finally, high rates of mood and anxiety disorders in the first-degree family members of children with ASD,[32,33] and conceptualization of

such problems as part of the broader autism phenotype,[34] raise the possibility of an underlying genetic predisposition to ER problems in ASD also. For all of these reasons, the authors assert that it is more appropriate to consider impaired ER as inherent to ASD itself (eg, stemming from or directly related to having ASD).

Consistent with the heuristic of transdiagnostic processes proposed by Nolen-Hoeksema and Watkins,[35] ER deficits within ASD may be conceptualized as a proximal risk factor for expressed psychopathology. Poor ER is proximal in that it underlies the observed psychopathology (eg, self-injury, anxiety). Impaired ER, likewise, is influenced by distal factors such as genetic predisposition, heightened baseline physiologic arousal, and atypical neural circuitry.[36,37] The influence of these distal factors on a person's ER deficits may be strengthened by problems such as alexithymia, poor perspective taking, and inadequate response inhibition. Moderating factors then operate to influence how the impaired ER might be expressed in a given individual and at a given time (multifinality). The youngster with ASD with poor ER ability, when faced with the need to interact with others in ambiguous situations (eg, sixth grade lunch-room), might become extremely anxious or agitated.

ILLUSTRATIVE CASE EXAMPLE

Johnny is a 12-year-old boy who was diagnosed with high-functioning autism at the age of 11, based on scores above the autism cut-off on the Autism Diagnostic Interview-Revised and above the autism spectrum disorder cut-off on the Autism Diagnostic Observation Schedule. He obtained a full-scale IQ score of 90. Johnny's family history is notable for several psychiatric disorders, with 3 first-degree relatives with a depression history, 1 with bipolar disorder, 3 with anxiety disorder diagnoses, and 2 with attention-deficit/hyperactivity disorder (ADHD). Johnny's first diagnosis, at the age of 7 years, was ADHD, which was followed 6 months later by a diagnosis of bipolar disorder. Between the ages of 8 and 11 years old, he was on 23 different medications in an attempt to manage his emotions and behavior. Unfortunately, the medications, particularly those utilized as a treatment for bipolar disorder, were not effective, and he developed tics. During this period of time, he also had 3 psychiatric hospitalizations. A comprehensive assessment of his psychiatric history using the Autism Comorbidity Interview[38] at age 12 supported a past depressive disorder diagnosis but failed to confirm the presence of bipolar disorder. Specifically, there was no evidence of any mania or hypomania. It was clear, however, that problems with self-control and ER were present as a very young child. He was an irritable toddler, easily triggered and upset, per his mother's report. When upset, he would bang his head or pull his hair out. Although he did "bounce between being sad or depressed and irritable or angry," further probing revealed clear ASD-related triggers to his mood changes, such as loud, sudden noises, his schedule being changed, or a meal being late triggering a meltdown, and poor social communication skills (eg, misunderstanding sarcasm), leading to frustration. He had very poor insight into these concerns, including low scores on several self-report psychiatric screeners. His treatment plan includes a focus on increasing his self-awareness and emotion understanding, reducing the number of psychotropic medications, conducting a functional behavior assessment to identify potential antecedents to his meltdowns, addressing the identified external triggers, and teaching him ER skills.

CURRENT APPROACHES TO PRACTICE

At this time, evidence-based tools with which to accurately assess ER that have been validated in clients with ASD are lacking. In light of difficulties with insight and labeling

of one's own emotions, self-report is likely to be insufficient on its own when completing the assessment and case formulation phase of treatment. Observational approaches (eg, seeing how the client responds to a mildly frustrating situation) can yield important information. It is important to assess the client's general attention to emotional states, capacity to connect to these states and describe them, and ability to differentiate among similar but unique emotions (eg, upset and angry). A thorough evaluation should also try to separate core impairments in receptive and expressive communication and social interaction from maladaptive ER. The types of regulatory strategies primarily relied on by the client, and those that may be underdeveloped, should inform treatment planning.

Although there is little controlled clinical research on the efficacy of ER-focused interventions for people with ASD, there are several plausible and potentially effective intervention approaches to consider. Drawing from the extant research on treatment of co-occurring problems, such as anxiety and mood disturbance, the predominant psychosocial approach is cognitive–behavioral therapy (CBT).[39–41] CBT-based approaches for clients with ASD often incorporate content to address ER deficits.[42,43] There is great variability in the degree to which ER training is included in such interventions, however, and evaluation of the relative import of various treatment components, including ER training, has not been conducted. Few treatment programs have been developed explicitly to improve ER ability in clients with ASD. The Exploring Feelings program[42] is a CBT-based intervention for school-aged children, with specific curricula for anxiety and for anger. It includes affect education, cognitive restructuring, and appropriate strategies to manage intense emotion. This program was recently modified for use with younger children (5–7 years) with ASD,[44] and results of an initial open trial indicated improvement in emotion lability and regulation.[45]

In light of evidence that individuals with ASD tend to engage in suppression and struggle with reappraisal, targeting increased cognitive flexibility in treatment is recommended.[23] There is empirical evidence that many of the cognitive regulatory strategies (eg, suppression, rumination) load onto a single latent factor and that these cognitive strategies are more strongly associated with psychopathology than adaptive cognitive strategies (eg, reappraisal, problem-solving).[9] Aldao and Nolen-Hoeksema[9] proposed that clients may develop a default regulatory approach that, in essence, overwhelms their ability to use newly learned, more adaptive strategies such as reappraisal. As such, treatments outside of traditional CBT, which tends to focus on restructuring of thoughts to alter feelings, may be beneficial. For example, meditation, mindfulness training, and acceptance-based approaches may help the client to reduce attempts to suppress feelings, which might enhance his or her willingness and ability to develop stronger adaptive regulatory strategies.

Psychoeducation and acceptance-based approaches may be especially helpful, given the chronic and pervasive nature of ASD. Indeed, a premise of dialectical behavior therapy (DBT[46]), a well-supported treatment for borderline personality disorder, which is characterized by extreme emotion dysregulation, is balancing acceptance of self (as is) with desire for change. Although there has been consideration of how to adapt DBT for clients with ASD,[47] there have been no clinical trials, and there is no published treatment outcome research. Mindfulness and acceptance-based approaches (MABIs), such as DBT, have been used extensively to treat problems with ER. MABIs differ from traditional CBT, primarily in how the patient's relationship to his/her feelings and thoughts is conceptualized. Rather than identification and alteration of maladaptive or incorrect thoughts and unhelpful feelings (CBT), MABIs strive to help the patient change his or her relationship with (or view of) the problem, become less fused with his or her own thoughts (accepting a thought as just a thought), and

behave in a fashion consistent with his or her goals and values.[48] MABIs are associated with strong and durable improvements in symptoms of anxiety and depression and increased use of adaptive ER strategies,[49] and they have recently been shown to be as effective as CBT for treatment of anxiety.[50]

Regardless of treatment approach, a more intensive focus on developing the client's emotional awareness and ability to recognize and report on his or her emotional state is often required for clients with ASD, compared to those with other (non-ASD) diagnoses. Improving emotional insight and regulatory skills can be complicated by other treatments the client is receiving, especially medication. Between 50% and 75% of child clients with ASD are prescribed psychoactive medications,[51–53] often for target problems that might arguably be rooted in poor ER, such as irritability.[54] If a medication is dampening an emotional response, this may further complicate efforts to work on increasing emotional insight and awareness.

Often it can be helpful to use visual strategies to work on identifying, understanding, and communicating about one's own emotions. One example of a visual system that is widely used to teach these basic emotion skills is The Incredible Five Point Scale.[55] Although there has not been any systematic research on this program, it was developed based on clinical experience, was designed specifically for ASD and related populations, and has been applied across the range of intellectual and verbal abilities. In short, it provides a metric for helping the child to identify and communicate varying degrees of emotion from a scale of 1 (this never bothers me) to 5 (this could make me lose control). The skills are taught using specific situations identified by the child and/or a caregiver or a standard set of picture cards of different situations, which the child then learns to place into a chart with pockets corresponding to 1 thru 5. The intent is that the child will learn to notice these situations, have a way to communicate about his or her emotions (eg, I am at a 3, either verbally or with picture cards), and then strategies can be taught regarding what to do in those situations. Although this is just 1 example, and it is a fairly narrow set of skills, the concepts the scale embodies (eg, incorporating visual cues, making emotion as concrete and possible, and individualizing ER interventions) are all useful approaches to consider.

Behaviors and deficits that are core to the ASD diagnosis (eg, impaired reciprocal social behavior) must be considered, and clinicians must be mindful of ASD-specific factors (both proximal and distal) that might influence ER ability. Related to this, moderators of poor ER manifestation can sometimes be managed antecedently (eg, planning for where to sit in the lunchroom). A common approach to handling problematic behavior is to complete a functional behavior analysis and, based on results, provide individualized positive behavioral supports (see also Doehring and Hagopian, this issue).[56] This approach often focuses on modifying external factors that may trigger negative emotional reactions. This type of intervention is rooted in a long history of behavioral analysis that has a wealth of support for its effectiveness dating back to the 1960s.[57] However, a limitation is that it tends to be focused on specific problems and situations and thus the impact may not generalize to other stress-provoking situations. Thus, while it is always useful to identify any environmental factors that may be exacerbating the situation, this needs to be supplemented with teaching of appropriate alternative behaviors and skills.

SUMMARY

In sum, it is important to consider ER deficits when addressing severe behavioral disturbance and situations of apparent psychiatric comorbidity in ASD. Poor regulation of emotions is likely to underlie many of the observed manifestations of both

internalizing and externalizing concerns. Further, impaired ER can exacerbate problems with attention, communication, problem solving, and social interaction.[58] This article outlined many characteristics of ASD that may directly contribute to impaired ER in this population, and how ER impairment then acts as a proximal risk factor for the expression of psychopathology in clients with ASD. Unfortunately, research on ER in ASD is in its infancy. Further research is needed to better understand the specific mechanisms involved.

Measures that are sensitive to ER deficits in ASD need to be developed and validated. Accurate assessment is critical, both in terms of its role in treatment planning,[13] and in determining outcome in clinical trials. For many reasons, standard measures developed for other populations may not be clinically sensitive or appropriate for use in ASD. Standard questionnaires are often verbally loaded with items such as "complains of" that make them inapplicable to the limited and nonverbal ASD population. Further, ER problems may manifest differently in ASD.[15,38,59] Thus, in order to improve both understanding and treatment of ER problems in ASD, assessment may need to be addressed first.

Given the growing body of research implicating ER deficits in many of the psychiatric and behavioral problems manifested by clients with ASD, the authors propose that a focus on ER and its possible expression in people with ASD be considered in research on treatment development and evaluation. Although this article described some treatment strategies that incorporate ER as a component of the intervention, there is very little clinical trials research in ASD explicitly focused on ER. Further, some treatments that effectively improve ER in other populations, such as acceptance and mindfulness-based interventions, have yet to be tested in ASD. There remains a critical need to develop and study effective treatments for the range of manifestations of ER concerns in ASD. The field of affective neuroscience has much to offer in this respect. It may be possible, for instance, to develop interventions that target ER capacity directly. Doing so may have cascading benefits on multiple expressed problems (eg, irritability, anxiety). Although this type of basic and applied research is needed across the lifespan in ASD, it is notable that there have been no published ER studies of adolescents with ASD. Given that this is a developmental period characterized by a heightened risk for psychopathology and emotional reactivity,[60] hormonal and neural changes that promote cognitive flexibility and increase the saliency of social incentives (eg, peer approval),[61] and complex and often highly ambiguous social challenges that require effective regulation of emotions for successful navigation, understanding the role of ER impairment in adolescence may be a priority.

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