Emotion regulation: A treatment target for autism spectrum disorder

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Individuals with autism spectrum disorder (ASD) tend to experience difficulties with emotion regulation (ER). Treatments designed to address ER difficulties in individuals with ASD are emerging. The authors review cognitive-behavioral therapy (CBT) and mindfulness-based treatments that have focused on ER difficulties in youth and young adults with ASD. In general, these treatments addressing ER skills have included awareness of emotions/psychoeducation about emotions, frustration tolerance, and ER skills, as well as practice and use of these skills during group therapy that sometimes includes caregivers. The results from these interventions are encouraging for individuals with high-functioning ASD because ER skills tend to improve following treatment. The inclusion of ER in other ASD treatments is discussed. (Bulletin of the Menninger Clinic, 83[3], 205–234)

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It is estimated that 1 in 59 children in the United States have autism spectrum disorder (ASD) (Baio et al., 2018). ASD is a neurodevelopmental disorder characterized by deficits associated with social-communication functioning and restricted and repetitive behaviors (American Psychiatric Association, 2013; Bauminger–Zviely, 2013; Hertz-Piccioto & Delwiche, 2009; Kanner, 1943). It is also well documented that children with ASD experience significant difficulties in emotion identification,

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expression, and regulation (Begeer, Koot, Rieffe, Terwogt, & Stegge, 2008; Cai, Richdale, Dissanayake, & Uljarević, 2018; Hepburn & Wolf, 2013; Joshi et al., 2018; White et al., 2013). However, until recently, difficulties with emotion regulation (ER) have not been a target of treatment in this population (Conner & White, 2018; Scarpa & Reyes, 2013; Weiss et al., 2018). In this article, we review the ER difficulties in individuals with ASD, highlight cognitive-behavioral therapy (CBT) and mindfulness-based interventions that have addressed ER skills in this population, and report on the initial efficacy achieved by these interventions. By directly addressing difficulties with ER, individuals with ASD may be better able to manage their emotional experiences and potentially improve their quality of life.

What are emotion regulation and emotionality?

The term *emotion regulation* includes the processes by which individuals modulate their emotional state to facilitate adaptive functioning (e.g., Cole, Martin, & Dennis, 2004; Eisenberg, Spinrad, & Eggum, 2010; Gross, 1998, 2008; Thompson, 1991; Thompson, Lewis, & Calkins, 2008). In other words, ER is an individual's ability to manage and change his or her emotional responses (e.g., occurrence, form, duration, and intensity) by engaging in behavioral strategies and cognitive processes (e.g., self-talk) to regulate continuous affective states in order to accomplish one's goals (Eisenberg & Spinrad, 2004; Gross & Thompson, 2007; Stringaris & Goodman, 2009; Thompson, 1994; Zelazo & Cunningham, 2007). ER is an important skill for individuals who have increased negative emotionality. *Negative emotionality* is described as an inclination to generate an intense negative emotional response to an affect-provoking stimulus (Diamond & Aspinwall, 2003; Eisenberg, Fabes, Karbon, et al., 1996; Eisenberg et al., 1995; Fredrickson, 2001; Sallquist, Eisenberg, Spinrad, Eggum, & Gaertner, 2009; Tugade & Fredrickson, 2007). These terms are related in that one can have high negative emotionality and thus be prone to respond negatively to an event (e.g., a child might become upset because she was not invited to her classmate's birthday party), but one

can also have ER skills or tools to deal with those negative emotions (i.e., she could use cognitive restructuring skills to feel better: "If I had been invited, I may not have had fun anyway because she is not really a close friend").

The importance of ER and negative emotionality as they relate to other areas of development has been examined in typically developing children (Eisenberg et al., 1993; Eisenberg, Fabes, Guthrie, et al., 1996; Lopes, Salovey, Côté, Beers, & Petty, 2005; Rothbart, Ziaie, & O'Boyle, 1992; Ungerer et al., 1990). For example, better ER skills are associated with increased positive social interactions (Eisenberg, Fabes, Schaller, Carlo, & Miller, 1991; Robin, Coplan, Fox, & Calkins, 1995) and increased prosocial behaviors (Eisenberg et al., 1995; Eisenberg, Fabes, Karbon, et al., 1996). Also, having well-developed ER skills is particularly important for individuals who experience greater negative affect, because negative emotionality has been found to be inversely associated with prosocial behaviors (Eisenberg et al., 1995) and social competence (Eisenberg, Fabes, Guthrie, & Reiser, 2000; Eisenberg et al., 1993). Notably, intervention programs addressing ER skills in typically developing children have shown that these skills can improve (e.g., Domitrovich, Cortes, & Greenberg, 2007; Havighurst, Harley, & Prior; 2004).

Moreover, the absence of foundational ER skills is associated with a number of psychiatric conditions. Over the past two decades, a number of research studies have documented that children and adolescents with other psychopathologies, such as anxiety, eating disorders, and oppositional defiant disorder, also tend to experience difficulties with ER (Essau, LeBlanc, & Ollendick, 2017). In addition, in a meta-analysis that reviewed the relationship between ER skills and mental in adults, the authors found that enhanced ER skills were associated with better mental health (Hu et al., 2014). The importance of having ER as a target of treatments has also been discussed (Berking & Wupperman, 2012; Berking et al., 2008). Although limited, some interventions have targeted ER skills in non-ASD populations with some positive outcomes in anxiety disorders (e.g., Cameron & Jago, 2008; Goldin & Gross, 2010; Mennin, 2006), borderline personality disorders (e.g., Gratz & Gunderson, 2006),

and eating disorders (e.g., Corstorphine, 2006). Thus, to address ER difficulties, previous treatments with a strong evidence base have been developed to support ER skills in the general population.

Emotionality and emotion regulation problems in ASD

It is well documented that children with ASD often demonstrate negative emotionality (Kasari & Sigman, 1997; Myles & Southwick, 1999; Smith-Myles & Adreon, 2001; Quek, Sofronoff, Sheffield, White, & Kelly, 2012), including irritability (Bryson et al., 2007; Sofronoff, Attwood, & Hinton, 2005), decreased positive affect (Capps, Kasari, Yirmiya, & Sigman, 1993; Konstantareas & Papageorgiou, 2006), and greater challenging and aggressive behavior (Capps et al., 1993) than their peers. Specifically, children with ASD tend to demonstrate more intensely negative emotional reactions than typically developing individuals (Capps et al., 1993; Joseph & Tager-Flusberg, 1997; Shalom et al., 2006) and are often described by their parents as more likely to experience tantrums and meltdowns (Kasari & Sigman, 1997; Myles & Southwick, 1999; Smith-Myles & Adreon, 2001). Also, prospective and retrospective studies have reported that infants at risk for developing ASD tend to show negative affect more than their typically developing peers (Yirmiya et al., 2006), and they are often viewed by their parents as having increased reactivity/distress, negative affect, and fussiness, in addition to displaying decreased positive affect (Bryson et al., 2004; Garon et al., 2009; Gomez & Baird, 2005; L. R. Watson et al., 2007; Zwaigenbaum et al., 2005).

In addition to experiencing greater emotionality and intensely negative emotions, youth with ASD generally have a harder time using ER skills. Konstantareas and Stewart (2006) conducted one of the first studies to examine ER skills in 3- to 10-year-old children with ASD. In this study, emotionality was assessed using the Soothability subscale of the Child Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001), and ER skills were measured by having the child participants engage in a stressful or mildly frustrating task (i.e., they were given a highly interesting toy, allowed to play with

it for 6–10 seconds, then asked to give it back to the examiner). Their responses were rated within 15 seconds after the examiner's request to give the toy back and were categorized in one of the following ways: physical objection, crying/venting, defending, verbal objection, doing nothing, self-distraction, directing situation, engaging in alternative activity, or complying. Children with ASD scored lower on measures of soothability, had greater variability in their ER abilities, and used more unsuccessful ER strategies (e.g., crying, doing nothing) than their typically developing peers (Konstantareas & Stewart, 2006). In a similar study, preschool-age children with ASD were also presented with stress tasks (e.g., the child is asked to solve an "unsolvable puzzle"; the child is given the "wrong" set of keys to open a transparent box with a toy inside; Jahromi, Meek, & Ober-Reynolds, 2012). During the stress tasks, children's use of ER skills was coded in one of three ways: constructive strategies, venting strategies, or avoidance strategies. Children with ASD had significant challenges in utilizing ER strategies related to goal-directed action, including strategies such as distraction, self-speech, vocal venting, physical venting, seeking social support, self-soothing, disruptive behavior, and avoidance. Research studies of older, school-age children have demonstrated that children with ASD show more variant ER skills to manage worry and rumination than their peers (Rieffe et al., 2011).

Other studies examining ER skills in adolescents and young adults with ASD have also demonstrated that those with ASD have poorer ER skills than their neurotypical peers, as evidenced by decreased use of cognitive reappraisal as well as increased use of maladaptive ER strategies, such as repetitive behaviors (Samson, Hardan, Lee, Phillips, & Gross, 2015; Samson, Hardan, Podell, Phillips, & Gross, 2015; Samson, Huber, & Gross, 2012; Samson, Wells, Phillips, Hardan, & Gross, 2015). For example, Samson et al. (2014) reported ER difficulties in 6- to 16- year old-youth with ASD, using the Emotion Dysregulation Index (a parent-report measure derived from certain items in the Child Behavior Checklist [CBCL]; Achenbach & Rescorla, 2001; Samson et al., 2014). Results from this study indicated that children and adolescents with ASD were viewed by their caregivers as having increased emotion dysregulation, which

was, in turn, associated with ASD symptoms measured by the Social Responsiveness Scale (SRS; Constantino & Gruber, 2005), the Repetitive Behavior Scale-Revised (RBS-R; Lam & Aman, 2007), and the Short Sensory Profile (Tomchek & Dunn, 2007). Using an older sample, Samson and colleagues (2012) used the Positive and Negative Affect Schedule (PANAS; D. Watson, Clark, & Tellegen, 1988) and the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) to assess ER skills in 18- to 53-year-olds with high-functioning ASD. Findings indicated that individuals with ASD reported increased negative emotionality, similar levels of positive emotions, more difficulty identifying/describing emotions, use of fewer cognitive reappraisal skills, and increased suppression of emotions than the comparison group. Overall, individuals with ASD across the life span appear to have greater difficulty using adaptive ER strategies, suggesting that these difficulties tend to persist over time.

In general, previous resesarch suggests that a hallmark of individuals with ASD is their difficulty with ER skills across the life span (Bauminger, 2002; Begeer et al., 2008; Jahromi, Gulsrud, & Kasari, 2008; Konstantareas & Stewart, 2006; McIntosh, Reichmann-Decker, Winkielman, & Wilbarger, 2006; Samson et al., 2014; Shalom et al., 2006; Weiss, 2014). It has been hypothesized that ER difficulties in ASD may be rooted in core deficits associated with the disorder (Begeer et al., 2008; Mazefsky et al., 2013), which include difficulty distinguishing between emotional experiences (e.g., sadness vs. anxiety), reduced emotion awareness, and cognitive rigidity (Downs & Smith, 2004; Laurent & Rubin, 2004; Shalom et al., 2006). Thus, individuals with ASD seem to be at greater risk than the general population for experiencing ER difficulties.

Emotion regulation treatments in ASD and their efficacy

Several research groups have developed and tested interventions to address ER difficulties in youth and young adults with ASD (Bauminger, 2002; Beaumont & Sofronoff, 2008a, 2008b; Conner & White, 2018; Scarpa & Reyes, 2013; Sofronoff et al., 2005; Sofronoff, Attwood, Hinton, & Levin, 2007; Weiss et al., 2018). These interventions have primarily focused on improv-

ing ER skills through the use of CBT and mindfulness-based principles and have reported encouraging findings (see Tables 1 and 2). Although other ASD-specific interventions address negative emotionality and challenging behaviors in young children with ASD, they are not described here because they are beyond the scope of this article.

In a seminal study, Bauminger (2002) designed and piloted an intervention to facilitate social and emotional understanding in 8- to 17-year-old children with high-functioning ASD (The term *high functioning* is used here to describe children with autism who have average or above average intelligence). This intervention curriculum included (a) instruction in social concepts (e.g., "what a friend is, why it is important to listen to a friend, how we listen to a friend, in what ways friends are alike or different"); (b) teaching simple emotions/affective education by describing several emotions, teaching how to recognize emotions (e.g., facial expressions, gestures, and vocalizations) in self and others in social situations; and (c) social-interpersonal problem solving (e.g., initiating a conversation with a peer, comforting a friend, and sharing experiences with a peer). The results from this study indicate that children with ASD who participated in the intervention program had significantly improved positive peer interactions, emotional understanding, and social problem-solving abilities.

In another study, Beaumont and Sofronoff (2008a) used the Junior Detective Training Program to address social and emotional competence in school-age children with ASD. The premise of this intervention was to include psychoeducation about feelings experienced in self and others. Specifically, in Level 1, children are taught to identify complex emotions (e.g., guilt, embarrassment, suspicion, and teasing) in characters in the game by decoding how "suspects" are feeling from their facial expressions, and body postures and prosody of speech. In Level 2 of the game, children "decode" how the characters in the game are feeling when presented with different nonverbal and environmental cues. Knowledge acquired from Level 1 and 2 is used to complete Level 3, which includes scenarios related to bullying, playing with others, and trying new things. Findings from this study indicate that children with ASD who participated in the

Table 1. A summary of studies addressing emotion regulation difficulties in ASD

Study (program name)	CBT Components	Control Group or Waitlist Group (*n*)	Age Group, Gender, and Participants	Efficacy Evidence
Bauminger, 2002	(a) Teaching affective education (e.g., simple and complex emotions) (b) Instruction in social concepts (c) Teaching social-interpersonal problem solving	*n* = 15: Intervention group only	8- to 17-year-olds (*n* = 11 boys; *n* = 4 girls) Children and Teens learned and practiced new skills with the assigned peer in a classroom setting. Teachers were trained to implement the intervention. Parents received information about the intervention to practice what the child was learning. Peers without ASD practiced the newly learned skills with the youth without ASD.	Children showed improvement in positive peer interactions, emotional understanding, and social problem-solving abilities.
Beaumont & Sofronoff, 2008a (Junior Detective Training Program)	(a) Teaching about feelings/emotions in self and others using a spy theme curriculum (b) Learning about ER skills (c) Practicing newly learned ER skills	*n* = 26: Intervention group; *n* = 23: Waitlist group	8- to 11-year-olds (*n* = 44 boys; *n* = 5 girls) Children participated in a child group and used computer games to learn about emotions and ER. Parents participated in a parent group and they learned about the skills that children were learning during the child group. The parent group also helped parents support their children in other settings. Teachers received 1- to 2-page weekly handouts about the intervention content.	Children demonstrated improvement in social skills and showed increased knowledge of ER skills.

Sofronoff, Attwood, & Hinton, 2005 (Exploring Feelings: Cognitive Therapy to Manage Anxiety)	(a) Teaching affective education (b) Instruction in and practicing ER skills (e.g., cognitive restructuring)	*n* = 23: Intervention group (child only); *n* = 23: Waitlist group (child only); *n* = 25: Intervention group (child + parent)	10- to 12-year-olds (*n* = 62 boys; *n* = 9 girls) Children participated in groups and received a workbook that included information about the skills learned each session. In two-parent dyads, a therapist covered material and practiced skills with two parents at the time. Parents were encouraged to practice skills and to complete homework.	Children demonstrated decreased anxiety-related emotions.
Sofronoff, Attwood, Hinton, & Levin, 2007 (Exploring Feelings: Cognitive Therapy to Manage Anger)	(a) Teaching ER skills to manage emotions associated with anger (b) Practicing ER skills (e.g., using social stories)	*n* = 24: Intervention group; *n* = 21: Waitlist group	10- to 14-year-olds (*n* = 43 boys; *n* = 2 girls) Children and Teens participated in child groups and received a workbook that included information about each session. Parents participated in a parent group to learn the material from each child session. Parents were also asked to practice skills at home and to complete homework with their child.	Children demonstrated decreased anger and increased knowledge of ER skills. Parents reported increased confidence in their ability to manage their child's anger.
Scarpa & Reyes, 2013 (Exploring Feelings for Young Children With High-Functioning Autism or Asperger's Disorder)	(a) Teaching about simple and complex emotions (b) Learning and practicing ER skills (e.g., relaxation, cognitive restructuring, social support)	*n* = 5: Intervention group; *n* = 6: Waitlist group	4.5- to 7-year-olds (*n* = 9 boys, *n* = 2 girls) Children participated in a child group and learned and practiced new skills.	Children demonstrated increased ER skills, shorter outbursts, and decreased negative/lability.
			Parents participated in a parent group that taught emotion knowledge and ER skills. Parents received handouts about the material covered, were assigned homework, and were encouraged to practice ER skills at home.	Parents reported increased confidence in their own ability and their child's ability to manage anger and anxiety.

Table 1. continued

Thomson, Riosa, & Weiss, 2015 (Secret Agent Society: Operation Regulation)	(a) Teaching emotion awareness (e.g., identifying emotions in self or others) using a spy-themed curriculum (b) Learning and practicing ER skills (e.g., relaxation, mindfulness, and acceptance activities)	*n* = 14: Intervention group only	8- to 12-year-olds (*n* = 13 boys; *n* = 1 girl) Children participated in child groups to cover and practice material. Parents were present in the child group to learn about the content of the intervention, to provide input about their child's ER difficulties at home, and to practice skills at home.	Children demonstrated an increase in ER knowledge, ER skills, and adaptive skills. Children showed decreases in negativity, mental health severity, number of diagnoses, and internalizing behaviors.
de Bruin, Blom, Smit, van Steensel, & Bögels, 2015 (MYmind Program).	(a) Applying mindfulness in stressful situations as it relates to ASD: Coping with changes; Dealing with feelings (e.g., where in the body one feels emotions)	*n* = 23: Intervention group only	11- to 23-year-olds (*n* = 17 boys; *n* = 6 girls) Children, Teens, and Young Adults participated in the mindfulness training groups and completed homework (e.g., practicing meditation, dairy registration, and reading handouts).	Youth reported decreased rumination.
	(b) Mindfulness training that focuses and enhances attention, body awareness, and self-control		Parents also participated in mindful parenting training, which emphasizes understanding parental reactivity, paying undivided attention to child, becoming aware of own boundaries, and accepting child and his or her challenges.	Parents also indicated improved mindfulness in parenting.

Conner & White, 2018	(a) Instruction in affective education and mindfulness practices (b) Learning and practicing engaging ER skills/coping strategies	*n* = 9: Intervention group only	15- to 18-year-olds (*n* = 7 boys, *n* = 2 girls) Teens and young adults attended group sessions to learn about mindfulness-based intervention to learn about ER skills.	Participants showed improvement in at least one area (i.e., impulse control, access to ER strategies, and emotional acceptance).
Weiss et al., 2018 (Secret Agent Society: Operation Regulation)	(a) Teaching emotion awareness (e.g., identifying emotions in self or others) using a spy-themed curriculum (e.g., using computer games, emotion education activities) (b) Learning and practicing ER skills (e.g., relaxation, mindfulness and acceptance activities, exposure)	*n* = 35: Intervention group; *n* = 33: Waitlist group	8- to 12-year-olds (*n* = 60 boys; *n* = 8 girls) Children participated in child groups to learn and practice material using a workbook. Parents participated in the child groups, where they learned about the material covered in the child group using a workbook. Parents were encouraged to support their child to transfer school to home and school. Teachers received weekly handouts about the intervention content.	Children demonstrated improvement on emotion regulation measures, including emotionality, emotion regulation abilities with social skills. Importantly, these improvements were maintained at a follow-up.
Salem-Guirgis et al., 2019 (MYmind Program)	(a) Teaching about awareness, distress tolerance, and self-control using mindfulness techniques (e.g., meditation, deep breathing, yoga)	*n* = 23: Intervention group only	12- to 23-year-olds (*n* = 19 boys; *n* = 4 girls) Teens and young adults participated in groups to learn and practice material. Parents participated in the parent group, which focused on teaching parents about reactivity, being nonjudgmental with their children, and accepting their children as well as their own feelings about parenting. Parents were also taught about mindful parenting skills and how to support their children to practice new skills.	Children showed increased emotion regulation skills after treatment. Parents also reported increased mindfulness.

Table 2. List of measures used to assess emotion regulation difficulties in ASD

Measure Name (Author)	Reporter	Content	Sensitivity to Change	Intervention Studies That Used Measure
Emotion Inventory (EI; Seidner, Stipek, & Feshbach, 1988)	Child	Assesses knowledge/understanding of emotional states. Children are asked to define emotions and to report a time that they experience that emotion (e.g., happiness, sadness, guilt, and pride).	Children reported increased knowledge of emotions as measured by the EI after treatment.	Bauminger, 2002
Emotion Regulation and Social Skills Questionnaire (ERSSQ; Bauminger & Sofronoff, 2008)	Parent	Assesses social behaviors and emotion regulation skills. Parents are asked how often their child engages in social behaviors and uses emotion regulation skills, including controlling anger/anxiety and using strategies to deal with feelings of sadness or disappointment.	Parents indicated that their children demonstrated improved social-emotional skills on the ERSSQ after treatment.	Beaumont & Sofronoff, 2008a; Salem-Guirgis et al., 2019; Weiss et al., 2018
James and the Math Test (Attwood, 2004a)	Child	Children are read a vignette about a boy who feels anxious, then children are asked to list suggestions for how the boy in the story could manage the anxiety.	Children reported an increased number of ER strategies to deal with anxiety on the vignette after treatment in all studies except Weiss et al., 2018.	Beaumont & Sofronoff, 2008a; Scarpa & Reyes, 2013; Thomson, Riosa, & Weiss, 2015; Weiss et al., 2018
Dylan is Being Teased (Attwood, 2004b)	Child	Children are read a vignette about a boy who feels angry, then children are asked to list suggestions for how the boy in the story could manage the anger.	Parents indicated that their children showed an increased number of ER strategies to deal with anger on the vignette after treatment in all studies except Weiss et al., 2018.	Beaumont & Sofronoff, 2008a; Scarpa & Reyes, 2013; Thomson, Riosa, & Weiss, 2015; Weiss et al., 2018
Behavior Monitoring Sheet (BMS; Scarpa & Reyes, 2013)	Parent	Assesses frequency and duration of behavioral outbursts related to anger or anxiety during 7 consecutive days.	Parents reported a decrease in the duration of outbursts in their children, but not a decrease in the frequency.	Scarpa & Reyes, 2013
Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997)	Parent	Assesses emotion intensity and emotion regulation skills. The ERC has two subscales: Lability/Negativity (e.g., mood swings and dysregulated negative affect) and Emotion Regulation (ER, e.g., self-awareness, appropriate emotionality).	Parents endorsed decreased emotionality in their children, as reported on the Lability/Negativity subscale in most studies. Increased ER skills were reported on the ER subscale in one study only (Salem-Guirgis et al., 2019).	Salem-Guirgis et al., 2019; Scarpa & Reyes, 2013; Thomson, Riosa, & Weiss, 2015; Weiss et al., 2018

Mindful Attention and Awareness Scale–Adolescent Version (MASS-A; Brown, West, Loverich, & Biegel, 2011; de Bruin, Zijlstra, van de Weijer-Bergsma, & Bogels, 2011)	Adolescent	A self-report that measures indication of trait mindfulness.	No changes in mindfulness trait were found after intervention in the MASS-A.	de Bruin et al., 2015
Ruminative Response Scale (RRS; Nolen-Hoeksema, 2000)	Adolescent	Measures an inclination to respond to a depressed mood with self-focus, symptom-focus, and focus on causes and consequences of this mood.	Adolescents indicated less engagement in rumination after treatment.	de Bruin et al., 2015; Salem-Guirgis et al., 2019
Five Facets of Mindfulness Questionnaire-Short Form (FFMQ-SF; Bohlmeijer, ten Klooster, Fledderus, Veehef, & Baer, 2011)	Parent	Measures five facets of general mindfulness, including observing, describing, acting with awareness, nonjudging, and nonreactivity.	Parents reported increased mindfulness in themselves on the FFMQ-SF.	de Bruin et al., 2015; Salem-Guirgis et al., 2019
Interpersonal Mindfulness in Parenting Scale (IM-P; de Bruin et al., 2012; Duncan, 2007)	Parent	Assesses mindfulness in parenting relationships, including listening with full attention, emotional awareness, self-regulation in parenting relationships, nonjudgmental acceptance, and compassion.	Parents also indicated increased mindfulness in themselves on the IM-P.	de Bruin et al., 2015; Salem-Guirgis et al., 2019
Child and Adolescent Mindfulness Measure (CAMM; Greco, Baer, & Smith, 2011)	Adolescent and young adult	Measures present awareness and mindfulness of adolescents.	No changes in mindfulness were reported on the CAMM.	Salem-Guirgis et al., 2019
Emotion Regulation Questionnaire-Child (ERQ-C; Gullone & Taffe, 2012)	Adolescent and young adult	Measure was used to assess adolescents' self-report of emotion regulation strategies (e.g., cognitive reappraisal and expressive suppression).	Although youth reported improvement on the ERQ's Cognitive Reappraisal subscale, these improvements were not maintained at follow-up.	Salem-Guirgis et al., 2019

program demonstrated improvement in social skills and made better suggestions regarding ER skills for story characters after treatment. More recently, similar and encouraging findings have been reported in interventions derived from the original Junior Detective Training Program with focus on ER skills (see below; Thomson, Riosa, & Weiss, 2015; Weiss et al., 2018).

Other interventions that have been developed for youth with ASD have more explicitly focused on teaching ER skills to manage emotions associated with anxiety and anger (Sofronoff et al., 2005, 2007). One such program is called, Exploring Feelings: Cognitive Behaviour Therapy to Manage Anxiety/Anger (Attwood, 2004a, 2004b, 2004c). In this intervention, affective education, cognitive restructuring, social stories, and ER tools were included to deal with anger and anxiety. Research examining this CBT-based intervention found that youth who participated in the program had significantly decreased anxiety and anger (Sofronoff et al., 2007). On the basis of Sofronoff and colleagues' work, Scarpa and Reyes (2011) also examined an intervention designed to address ER skills in 5- to 7-year-old children through the use of a cognitive-behavioral program, Exploring Feelings for Young Children With High-Functioning Autism or Asperger's Disorder (Scarpa, Wells, & Attwood, 2012). Specifically, this CBT-based intervention focused on teaching children specific ER skills (e.g., relaxation, cognitive restructuring, social support) that they can use when experiencing negative emotions. After participating in this intervention, children with ASD were viewed by their parents as having less negative lability, better ER skills, and shorter outbursts. Importantly, this intervention had an active parent component, and participating parents also reported increased confidence in their own ability and their child's ability to manage emotional states related to anger and anxiety (Scarpa & Reyes, 2011).

Regarding adolescents and young adults, three studies have also addressed ER difficulties in this population using mindfulness-based programs (Conner & White, 2018; de Bruin, Blom, Smit, van Steensel, & Bögels, 2015; Salem-Guirgis et al., 2019). De Bruin et al. (2015), Ridderinkhof, de Bruin, Blom, and Bögels (2018), and Salem-Guirgis et al. (2019) examined the feasibility and efficacy of the MYmind Program, a mindfulness-based

intervention for adolescents and young adults. This program focuses on teaching awareness of emotions and learning and practicing strategies to increase distress tolerance and self-control. De Bruin and colleagues found that participants reported improvements in their quality of life and less rumination after treatment. Parents also indicated improvements in parenting mindfulness and mindfulness in general. Similarly, Salem-Guirgis et al. also found that participants and their parents reported improved ER skills and increased mindfulness after treatment, respectively.

Finally, Conner and White (2018) examined the feasibility and efficacy of an adapted mindfulness-based individual therapy addressing ER difficulties in young adults with ASD. This intervention included affective education, mindfulness practice, and engaging/disengaging ER skills/coping strategies (e.g., acceptance, reappraisal, problem solving, rumination, avoidance, and blowing up/shutting down). Results from this study suggest that the majority of participants showed improvement in at least one of the following areas: impulse control, access to ER strategies, and emotional acceptance.

In sum, previous findings indicate that CBT- and mindfulness-based interventions may be efficacious in addressing ER skills in ASD. It is possible that the several components of these interventions, such as focusing on direct teaching of emotions, ongoing practice of skills, and including parents to help with generalization, are some of the elements that promote improvement in ER skills in those with ASD. Although few empirically tested interventions have been developed to improve the ability of individuals with ASD to manage their emotions, these findings are promising and suggest that ER skills are amenable to treatment in this population.

Inclusion of emotion regulation in mental health Interventions in ASD

Mental health difficulties have been widely reported in individuals with ASD (de Bruin, Ferdinand, Meester, de Nijs, & Verheij, 2007; Hepburn, Stern, Blakeley-Smith, Kimel, & Reaven, 2014; Leyfer et al., 2006; van Steensel, Bögels, & de Bruin, 2013). For

instance, it is estimated that 40% of children and adolescents with ASD experience at least one anxiety disorder (van Steensel et al., 2013). Thus, anxiety is often the target of treatment in children and adolescents with ASD (Reaven, Blakeley-Smith, Culhane-Shelburne, & Hepburn, 2012; Reaven, Blakeley-Smith, Leuthe, Moody, & Hepburn, 2012; White, Ollendick, Scahill, Oswald, & Albano, 2009; Wood et al., 2009). In addition, children with high-functioning ASD are prone to experiencing elevated depressive symptoms (Ghaziuddin, Ghaziuddin, & Greden, 2002; Ghaziuddin & Greden, 1998; Hallett, Ronald, Rijsdijk, & Happé, 2010; Stewart, Barnard, Pearson, Hasan, & O'Brien, 2006). Although there has been recent emphasis on targeting specific mental health symptoms in youth with ASD, it has been argued that foundational ER difficulties may actually explain the comorbidity of ASD with mood, anxiety, and behavior disorders (Mazefsky et al., 2013). Given that individuals with ASD are at greater risk for experiencing co-occurring mental health problems and ER difficulties than the general population, a number of interventions developed for youth with ASD have targeted ER difficulties jointly with mental health symptoms, such as anxiety.

Two studies with children have reported encouraging findings from interventions that have addressed ER and mental health using the Secret Agent Society: Operation Regulation (SAS:OR; Thomson et al., 2015), which is a version of the Junior Detective Training Program noted above (Beaumont & Sofronoff, 2008a, 2013). The SAS:OR differs from the Junior Detective Training Program in that it has a greater focus on ER skills (e.g., subjective units of distress scaling, mindfulness and acceptance activities, planned exposure). This spy-themed intervention contains 10 individual sessions, which include psychoeducation, in vivo practice of skills, planning for using ER skills within challenging settings, and positive reinforcement for use of learned ER skills across settings. In general, the SAS:OR program progresses from teaching basic emotional awareness to using ER skills to manage anxiety and anger. The SAS:OR also incorporates a child and parent workbook, a home-school diary (to help with generalization and maintenance), a computer

game, use of visual materials, and teacher handouts with a summary of each session. Parents also participate in this intervention because they have their own manual, which in turn helps promote the generalization of ER skills at home.

In the first study examining the efficacy of the SAS:OR intervention, Thomson et al. (2015) demonstrated that children (N = 14) who participated in SAS:OR reported more appropriate ER strategies in response to vignettes depicting a character having to deal with anger and anxiety, as well as decreased dysregulation, as measured by the Children's Emotion Management Scale: Anger, Sadness, Worry questionnaire (Zeman, Cassano, Suveg, & Shipman, 2010; Zeman, Shipman, & Penza-Clyve, 2001). Parents also reported that their child had improved ER skills (e.g., less lability and negativity reported on the Emotion Regulation Checklist [ERC]; Shields & Cicchetti, 1997, 2001), fewer internalizing and externalizing symptoms, better adaptive skills, fewer anxiety diagnoses, and lower severity of anxiety symptoms. Similarly, Weiss et al. (2018) used the SAS:OR, and results from their study demonstrated that children (N = 68) who participated in the treatment showed improvement on measures of ER skills (i.e., emotionality, emotion regulation abilities, social skills), decreased psychopathology (i.e., internalizing and externalizing symptoms), and increased adaptive functioning, when compared to a waitlist control group.

Finally, three studies have also examined the efficacy of mindfulness-based interventions to improve mindfulness skills and to address emotional and behavior problems in ASD (Kiep, Spek, & Hoeben, 2015; Ridderinkhof et al., 2018; Spek, van Ham, & Nyklíček, 2013). Ridderinkhof et al. reported that children and adolescents with ASD showed improvement in their emotional and behavioral functioning. Their parents also reported improved parenting and emotional and behavioral functioning, as well as better mindfulness awareness after treatment. Spek et al. also found that adults with ASD demonstrated decreased anxiety and depressive symptoms, as well as a reduction in rumination after treatment. Similarly, Kiep and colleagues reported that adults with ASD showed increased positive affect and decreased rumination after treatment. They also endorsed

decreased anxiety, depression, agoraphobia, somatization, inadequacy in thinking and acting, distrust and interpersonal sensitivity, and sleeping difficulties after treatment. Although these interventions did not focus on ER skills, the findings suggest that increased mindfulness may also lead to better behavioral and emotional health in individuals with ASD. Of note, other anxiety-based treatments for youth with ASD also teach ER skills as part of the CBT programs (e.g., Reaven, Blakeley-Smith, Culhane-Shelburne, & Hepburn, 2012); however, these studies typically have not reported on ER outcomes.

Importance of emotion regulation: Future research and conclusions

ER appears to be an essential milestone in children's emotional development (Saarni, 1999) and is viewed as a critical skill in the development of emotional and social competence (Eisenberg et al., 2001; Gross & Munoz, 1995; Saarni, 1999, 2000). That is, a child's ability to regulate negative emotions is directly related to positive peer relationships and flexibility within a range of important daily activities. Moreover, ER difficulties are associated with a number of other psychiatric conditions. A large body of research indicates that children with ASD are prone to experience substantial ER difficulties, and those difficulties might represent an underlying process directly related to overall adjustment and mental health. This underlying connection is an area for future research.

Previous research indicates that interventions that have included ER as a target of treatment have shown some initial efficacy in improving ER skills in individuals with ASD. More recently, a handful of interventions have also addressed ER skills and mental health concerns in this population, and those results are also promising, as some ER skills seem to improve and mental health problems tend to decrease after treatment participation. In general, these CBT and mindfulness-based interventions included emotion education/emotion awareness, learning and practice of ER skills, and distress tolerance. Notably, two limita-

tions from previous studies are that the measures used to assess ER skills have not been validated in this population and these interventions have included only high-functioning individuals with ASD. Also, future research is needed to more thoroughly examine the ER outcomes related to specific ER treatments. For example, in addition to mental health, interventions targeting social skills might need to include a strong ER component to be more effective for individuals with ASD (Pouw, Rieffe, Stockmann, & Gadow, 2013; Southam-Gerow & Kendall, 2002; Suveg & Zeman, 2004). Given that impaired ER skills in youth with ASD may directly affect adaptive functioning, interpersonal relationships, and vocational status, including ER as a target of treatment might, in turn, enhance the quality of life of individuals with ASD.

To conclude, ER might be a construct that cuts across traditional diagnostic boundaries and may be more reflective of processes that underlie specific symptomatology or behavioral expressions in multiple diagnoses rather than any one specific syndrome (Weiss, 2014). A number of research studies have demonstrated a clear relationship between decreased ER abilities and increased externalizing and internalizing behaviors in non-ASD populations across the life span (Eisenberg, Spinrad, & Eggum, 2010). In this context, ER appears to represent a nonspecific risk factor for maladjustment across multiple mental health domains. Although ER research is in its early stages within the ASD field, results to date are promising, and it may be the case that ER skill building as a first-line treatment could be the foundation of positive mental health outcomes broadly.

References

Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA School-Age Forms & Profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Attwood, T. (2004a). Cognitive behaviour therapy for children and adults with Asperger's syndrome. *Behaviour Change*, *21*, 147–161.

Attwood, T. (2004b). *Exploring feelings (Anger)*. Arlington, TX: Future Horizons.

Attwood, T. (2004c). *Exploring feelings: Cognitive behaviour therapy to manage anxiety*. Arlington, TX: Future Horizons.

Baio, J., Wiggins, L., Christensen, D. L., Maenner, M. J., Daniels, J., Warren, Z., . . . Dowling, N. F. (2018). Prevalence of autism spectrum disorder among children aged 8 years—Autism and Developmental Disabilities Monitoring Network, 11 sites, United States, 2014. *MMWR Surveillance Summaries, 67*(6), 1–23.

Bauminger, N. (2002). The facilitation of social-emotional understanding and social interaction in high-functioning children with autism: Intervention outcomes. *Journal of Autism and Developmental Disorders, 32*, 283–298.

Bauminger-Zviely, N. (2013). *Social and academic abilities in children with high-functioning autism spectrum disorders*. New York, NY: Guilford Press.

Beaumont, R., & Sofronoff, K. (2008a). A multi‐component social skills intervention for children with Asperger syndrome: The Junior Detective Training Program. *Journal of Child Psychology and Psychiatry, 49*, 743–753.

Beaumont, R. B., & Sofronoff, K. (2008b). A new computerized advanced theory of mind measure for children with Asperger syndrome: The ATOMIC. *Journal of Autism and Developmental Disorders, 38*, 249–260.

Beaumont, R., & Sofronoff, K. (2013). Multimodal intervention for social skills training in students with high-functioning ASD: The Secret Agent Society. In A. Scarpa, S. W. White, & T. Attwood (Eds.), *CBT for children and adolescents with high-functioning autism spectrum disorders* (pp. 173–198). New York, NY: Guilford.

Begeer, S., Koot, H. M., Rieffe, C., Terwogt, M., & Stegge, H. (2008). Emotional competence in children with autism: Diagnostic criteria and empirical evidence. *Developmental Review, 28*, 342–369. https://doi.org/10.1016/j.dr.2007.09.001

Berking, M., & Wupperman, P. (2012). Emotion regulation and mental health: Recent findings, current challenges, and future directions. *Current Opinion in Psychiatry, 25*, 128–134.

Berking, M., Wupperman, P., Reichardt, A., Pejic, T., Dippel, A., & Znoj, H. (2008). Emotion-regulation skills as a treatment target in psychotherapy. *Behaviour Research and Therapy, 46*, 1230–1237.

Bohlmeijer, E., ten Klooster, P. M., Fledderus, M., Veehef, M., & Baer, R. (2011). Psychometric properties of the Five Facet Mindfulness Questionnaire in depressed adults and the development of a short form. *Assessment, 18,* 308–320.

Brown, K. W., West, A. M., Loverich, T. M., & Biegel, G. M. (2011). Assessing adolescent mindfulness: Validation of an adapted Mindful

Attention Awareness Scale in adolescent normative and psychiatric populations. *Psychological Assessment, 23*, 1023–1033.
Bryson, S. E., Landry, R., Czapinski, P., McConnell, B., Rombough, V., & Wainwright, A. (2004). Autistic spectrum disorders: Causal mechanisms and recent findings on attention and emotion. *International Journal of Special Education, 19*, 14–22.
Bryson, S. E., Zwaigenbaum, L., Brian, J., Roberts, W., Szatmari, P., Rombough, V., & McDermott, C. (2007). A prospective case series of high-risk infants who developed autism. *Journal of Autism and Developmental Disorders, 37*, 12–24.
Cai, R. Y., Richdale, A. L., Dissanayake, C., & Uljarević, M. (2018). Brief report: Inter-relationship between emotion regulation, intolerance of uncertainty, anxiety, and depression in youth with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 48*, 316–325.
Cameron, L. D., & Jago, L. (2008). Emotion regulation interventions: A common-sense model approach. *British Journal of Health Psychology, 13*, 215–221.
Capps, L., Kasari, C., Yirmiya, N., & Sigman, M. (1993). Parental perception of emotional expressiveness in children with autism. *Journal of Consulting and Clinical Psychology, 61*, 475–484.
Cole, P. M., Martin, S. E., & Dennis, T. A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development, 75*, 317–333.
Conner, C. M., & White, S. W. (2018). Brief report: Feasibility and preliminary efficacy of individual mindfulness therapy for adults with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 48*, 290–300.
Constantino, J. N., & Gruber, C. P. (2005). *Social Responsiveness Scale (SRS)*. Los Angeles, CA: Western Psychological Services.
Corstorphine, E. (2006). Cognitive–emotional–behavioural therapy for the eating disorders: Working with beliefs about emotions. *European Eating Disorders Review, 14*, 448–461.
de Bruin, E. I., Blom, R., Smit, F. M., van Steensel, F. J., & Bögels, S. M. (2015). MYmind: Mindfulness training for youngsters with autism spectrum disorders and their parents. *Autism, 19*, 906–914.
de Bruin, E. I., Ferdinand, R. F., Meester, S., de Nijs, P. F., & Verheij, F. (2007). High rates of psychiatric co-morbidity in PDD-NOS. *Journal of Autism and Developmental Disorders, 37*, 877–886.
de Bruin, E. I., Zijlstra, B. J. H., van de Weijer-Bergsma, E., & Bögels, S. M. (2011). The Mindful Attention Awareness Scale for Adolescents (MAAS-A): Psychometric properties in a Dutch sample. *Mindfulness, 2*, 201–211.
Diamond, L. M., & Aspinwall, L. G. (2003). Emotion regulation across the life span: An integrative perspective emphasizing self-regulation,

positive affect, and dyadic processes. *Motivation and Emotion, 27*, 125–156. https://doi.org/10.1023/A:1024521920068

Domitrovich, C. E., Cortes, R. C., & Greenberg, M. T. (2007). Improving young children's social and emotional competence: A randomized trial of the preschool "PATHS" curriculum. *Journal of Primary Prevention, 28*, 67–91.

Downs, A., & Smith, T. (2004). Emotional understanding, cooperation, and social behavior in high-functioning children with autism. *Journal of Autism and Developmental Disorders, 34*, 625–635.

Duncan, L. G. (2007). *Assessment of mindful parenting among parents of early adolescents: Development and validation of the Interpersonal Mindfulness in Parenting Scale* (Unpublished dissertation). The Pennsylvania State University.

Eisenberg, N., Cumberland, A., Spinrad, T. L., Fabes, R. A., Shepard, S. A., Reiser, M., . . . Guthrie, I. K. (2001). The relations of regulation and emotionality to children's externalizing and internalizing problem behavior. *Child Development, 72,* 1112–1134.

Eisenberg, N., Fabes, R. A., Bernzweig, J., Karbon, M., Poulin, R., & Hanish, L. (1993). The relations of emotionality and regulation to preschoolers' social skills and sociometric status. *Child Development, 64*, 1418–1438. https://doi.org/10.1111/j.1467-8624.1993.tb02961.x

Eisenberg, N., Fabes, R. A., Guthrie, I. K., Murphy, B. C., Maszk, P., Holmgren, R., & Suh, K. (1996). The relations of regulation and emotionality to problem behavior in elementary school children. *Development and Psychopathology, 8*, 141–162. https://doi.org/10.1017/S095457940000701X

Eisenberg, N., Fabes, R. A., Guthrie, I. K., & Reiser, M. (2000). Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology, 78*, 136–157. https://doi.org/10.1037/0022-3514.78.1.136

Eisenberg, N., Fabes, R. A., Karbon, M., Murphy, B. C., Wosinski, M., Polazzi, L., . . . Juhnke, C. (1996). The relations of children's dispositional pro-social behavior to emotionality, regulation, and social functioning. *Child Development, 67*, 974–992.

Eisenberg, N., Fabes, R. A., Murphy, B., Maszk, P., Smith, M., & Karbon, M. (1995). The role of emotionality and regulation in children's social functioning: A longitudinal study. *Child Development, 66*, 1360–1384. https://doi.org/10.1111/j.1467-8624.1995.tb00940.x

Eisenberg, N., Fabes, R. A., Schaller, M., Carlo, G., & Miller, P. A. (1991). The relations of parental characteristics and practices to children's vicarious emotional responding. *Child Development, 62*, 1393–1408.

Eisenberg, N., & Spinrad, T. L. (2004). Emotion-related regulation: Sharpening the definition. *Child Development, 75*, 334–339.

Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology, 6*, 495–525.

Essau, C. A., LeBlanc, S. S., & Ollendick, T. H. (Eds.). (2017). *Emotion regulation and psychopathology in children and adolescents*. New York, NY: Oxford University Press.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*, 218–226. https://doi.org/10.1037/0003-066X.56.3.218

Garon, N., Bryson, S. E., Zwaigenbaum, L., Smith, I. M., Brian, J., Roberts, W., & Szatmari, P. (2009). Temperament and its relationship to autistic symptoms in a high-risk infant sib cohort. *Journal of Abnormal Child Psychology, 37*, 59–78.

Ghaziuddin, M., Ghaziuddin, N., & Greden, J. (2002). Depression in persons with autism: Implications for research and clinical care. *Journal of Autism and Developmental Disorders, 32*, 299–306.

Ghaziuddin, M., & Greden, J. (1998). Depression in children with autism/pervasive developmental disorders: A case-control family history study. *Journal of Autism and Developmental Disorders, 28*, 111–115.

Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*, 83–91.

Gomez, C. R., & Baird, S. (2005). Identifying early indicators for autism in self-regulation difficulties. *Focus on Autism and Other Developmental Disabilities, 20*(2), 106–116.

Gratz, K. L., & Gunderson, J. G. (2006). Preliminary data on an acceptance-based emotion regulation group intervention for deliberate self-harm among women with borderline personality disorder. *Behavior Therapy, 37*, 25–35.

Greco, L. A., Baer, R. A., & Smith, G. T. (2011). Assessing mindfulness in children and adolescents: Development and validation of the Child and Adolescent Mindfulness Measure (CAMM). *Psychological Assessment, 23*, 606–614.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*, 271–299.

Gross, J. J. (2008). Emotion regulation. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotions* (pp. 497–513). New York, NY: Guilford Press.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*, 348–362.

Gross, J. J., & Munoz, R. F. (1995). Emotion regulation and mental health. *Clinical Psychology: Science and Practice, 2*, 151–164.

Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3–24). New York, NY: Guilford Press.

Gullone, E., & Taffe, J. (2012). The Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA): A psychometric evaluation. *Psychological Assessment, 24*, 409–417.

Hallett, V., Ronald, A., Rijsdijk, F., & Happé, F. (2010). Association of autistic-like and internalizing traits during childhood: A longitudinal twin study. *American Journal of Psychiatry, 167*, 809–817.

Havighurst, S. S., Harley, A., & Prior, M. (2004). Building preschool children's emotional competence: A parenting program. *Early Education & Development, 15*, 423–448.

Hepburn, S. L., Stern, J. A., Blakeley-Smith, A., Kimel, L. K., & Reaven, J. A. (2014). Complex psychiatric comorbidity of treatment-seeking youth with autism spectrum disorder and anxiety symptoms. *Journal of Mental Health Research in Intellectual Disabilities, 7*, 359–378.

Hepburn, S., & Wolf, B. (2013). Self-regulation in persons with autism spectrum disorders. In K. C. Barrett, N. A. Fox, G. A. Morgan, D. J. Fidler, & L. A. Daunhauer (Eds.), *Handbook of self-regulatory processes in development: New directions and international perspectives* (pp. 429–452). New York, NY: Psychology Press.

Hertz-Picciotto, I., & Delwiche, L. (2009). The rise in autism and the role of age at diagnosis. *Epidemiology (Cambridge, Mass.), 20*(1), 84–90.

Hu, T., Zhang, D., Wang, J., Mistry, R., Ran, G., & Wang, X. (2014). Relation between emotion regulation and mental health: A meta-analysis review. *Psychological Reports, 114*, 341–362.

Jahromi, L. B., Gulsrud, A., & Kasari, C. (2008). Emotional competence in children with Down syndrome: Negativity and regulation. *American Journal on Mental Retardation, 113*, 32–43.

Jahromi, L. B., Meek, S. E., & Ober-Reynolds, S. (2012). Emotion regulation in the context of frustration in children with high functioning autism and their typical peers. *Journal of Child Psychology and Psychiatry, 53*, 1250–1258.

Joseph, R. M., & Tager-Flusberg, H. (1997). An investigation of attention and affect in children with autism and Down syndrome. *Journal of Autism and Developmental Disorders, 27*, 385–396.

Joshi, G., Wozniak, J., Fitzgerald, M., Faraone, S., Fried, R., Galdo, M., . . . Biederman, J. (2018). High risk for severe emotional dysregulation in psychiatrically referred youth with autism spectrum disorder: A controlled study. *Journal of Autism and Developmental Disorders, 48*, 3101–3115.

Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child, 2*, 217–250.

Kasari, C., & Sigman, M. (1997). Linking parental perceptions to interactions in young children with autism. *Journal of Autism and Developmental Disorders, 27*, 39–57. https://doi.org/10.1023/A:1025869105208

Kiep, M., Spek, A. A., & Hoeben, L. (2015). Mindfulness-based therapy in adults with an autism spectrum disorder: Do treatment effects last? *Mindfulness, 6*, 637–644.

Konstantareas, M. M., & Papageorgiou, V. (2006). Effects of temperament, symptom severity and level of functioning on maternal stress in Greek children and youth with ASD. *Autism, 10*, 593–607. https://doi.org/10.1177/1362361306068511

Konstantareas, M. M., & Stewart, K. (2006). Affect regulation and temperament in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 36*, 143–154. https://doi.org/10.1007/s10803-005-0051-4

Lam, K. S., & Aman, M. G. (2007). The Repetitive Behavior Scale-Revised: Independent validation in individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 37*, 855–866.

Laurent, A. C., & Rubin, E. (2004). Challenges in emotional regulation in Asperger's syndrome and high-functioning autism. *Topics in Language Disorders, 24*, 286–297.

Leyfer, O. T., Folstein, S. E., Bacalman, S., Davis, N. O., Dinh, E., Morgan, J., . . . Lainhart, J. E. (2006). Comorbid psychiatric disorders in children with autism: Interview development and rates of disorders. *Journal of Autism and Developmental Disorders, 36*, 849–861.

Lopes, P. N., Salovey, P., Côté, S., Beers, M., & Petty, R. E. (2005). Emotion regulation abilities and the quality of social interaction. *Emotion, 5*, 113–118.

Mazefsky, C. A., Herrington, J., Siegel, M., Scarpa, A., Maddox, B. B., Scahill, L., & White, S. W. (2013). The role of emotion regulation in autism spectrum disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 52*, 679–688.

McIntosh, D. N., Reichmann-Decker, A., Winkielman, P., & Wilbarger, J. L. (2006). When the social mirror breaks: Deficits in automatic, but not voluntary, mimicry of emotional facial expressions in autism. *Developmental Science, 9*, 295–302.

Mennin, D. S. (2006). Emotion regulation therapy: An integrative approach to treatment-resistant anxiety disorders. *Journal of Contemporary Psychotherapy, 36*, 95–105.

Myles, B. S., & Southwick, J. (1999). *Asperger syndrome and difficult moments: Practical solutions for tantrums, rage, and meltdowns*. Shawnee Mission, KS: Autism Asperger Publishing.

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology, 109*, 504–511.

Pouw, L. B., Rieffe, C., Stockmann, L., & Gadow, K. D. (2013). The link between emotion regulation, social functioning, and depression in boys with ASD. *Research in Autism Spectrum Disorders, 7*, 549–556.

Quek, L. H., Sofronoff, K., Sheffield, J., White, A., & Kelly, A. (2012). Co‐occurring anger in young people with Asperger's syndrome. *Journal of Clinical Psychology, 68*, 1142–1148.

Reaven, J., Blakeley‐Smith, A., Culhane‐Shelburne, K., & Hepburn, S. (2012). Group cognitive behavior therapy for children with high‐functioning autism spectrum disorders and anxiety: A randomized trial. *Journal of Child Psychology and Psychiatry, 53*, 410–419.

Reaven, J., Blakeley-Smith, A., Leuthe, E., Moody, E., & Hepburn, S. (2012). Facing your fears in adolescence: Cognitive-behavioral therapy for high-functioning autism spectrum disorders and anxiety. *Autism Research and Treatment*, *2012*, 423905.

Ridderinkhof, A., de Bruin, E. I., Blom, R., & Bögels, S. M. (2018). Mindfulness-based program for children with autism spectrum disorder and their parents: Direct and long-term improvements. *Mindfulness, 9*, 773–791.

Rieffe, C., Oosterveld, P., Terwogt, M. M., Mootz, S., Van Leeuwen, E., & Stockmann, L. (2011). Emotion regulation and internalizing symptoms in children with autism spectrum disorders. *Autism, 15*, 655–670.

Robin, K. H., Coplan, R. J., Fox, N. A., & Calkins, S. D. (1995). Emotionality, emotion regulation, and preschoolers' social adaptation. *Development and Psychopathology, 7*, 49–62.

Rothbart, M. K., Ahadi, S. A., Hershey, K. L., & Fisher, P. (2001). Investigations of temperament at 3–7 years: The children's behavior questionnaire. *Child Development, 72*, 1394–1408.

Rothbart, M. K., Ziaie, H., & O'Boyle, C. G. (1992). Self-regulation and emotion in infancy. *New Directions for Child and Adolescent Development,* (55), 7–23. https://doi.org/10.1002/cd.23219925503

Saarni, C. (1999). *The development of emotional competence*. New York, NY: Guilford Press.

Saarni, C. (2000). Emotional competence: A developmental perspective. In R. E. Bar-On & D. A. Parker (Eds.), *The handbook of emotional intelligence: Theory, development, assessment, and application at home, school, and in the workplace* (pp. 68–91). San Francisco, CA: Jossey-Bass.

Salem-Guirgis, S., Albaum, C., Tablon, P., Riosa, P. B., Nicholas, D. B., Drmic, I. E., & Weiss, J. A. (2019). MYmind: A concurrent group-based mindfulness intervention for youth with autism and

their parents. *Mindfulness*. Advance online publication. https://doi.org/10.1007/s12671-019-01107-9

Sallquist, J., Eisenberg, N., Spinrad, T. L., Eggum, N. D., & Gaertner, B. M. (2009). Assessment of preschooler's positive empathy: Concurrent and longitudinal relations with positive emotion, social competence, and sympathy. *Journal of Positive Psychology, 4*, 223–233. https://doi.org/10.1080/17439760902819444

Samson, A. C., Hardan, A. Y., Lee, I. A., Phillips, J. M., & Gross, J. J. (2015). Maladaptive behavior in autism spectrum disorder: The role of emotion experience and emotion regulation. *Journal of Autism and Developmental Disorders, 45*, 3424–3432.

Samson, A. C., Hardan, A. Y., Podell, R. W., Phillips, J. M., & Gross, J. J. (2015). Emotion regulation in children and adolescents with autism spectrum disorder. *Autism Research*, *8*(1), 9–18.

Samson, A. C., Huber, O., & Gross, J. J. (2012). Emotion regulation in Asperger's syndrome and high-functioning autism. *Emotion, 12*, 659–665.

Samson, A. C., Phillips, J. M., Parker, K. J., Shah, S., Gross, J. J., & Hardan, A. Y. (2014). Emotion dysregulation and the core features of autism spectrum disorder. *Journal of Autism and Developmental Disorders, 44*, 1766–1772.

Samson, A. C., Wells, W. M., Phillips, J. M., Hardan, A. Y., & Gross, J. J. (2015). Emotion regulation in autism spectrum disorder: Evidence from parent interviews and children's daily diaries. *Journal of Child Psychology and Psychiatry, 56*, 903–913.

Scarpa, A., & Reyes, N. M. (2011). Improving emotion regulation with CBT in young children with high functioning autism spectrum disorders: A pilot study. *Behavioural and Cognitive Psychotherapy, 39*, 495–500.

Scarpa, A., Wells, A., & Attwood, T. (2012). *Exploring feelings for young children with high-functioning autism or Asperger's disorder: The STAMP treatment manual*. London, UK: Jessica Kingsley Publishers.

Seidner, L. B., Stipek, D. J., & Feshbach, N. D. (1988). A developmental analysis of elementary school-aged children's concepts of pride and embarrassment. *Child Development, 59*, 367–377.

Shalom, D. B., Mostofsky, S. H., Hazlett, R. L., Goldberg, M. C., Landa, R. J., Faran, Y., . . . Hoehn-Saric, R. (2006). Normal physiological emotions but differences in expression of conscious feelings in children with high-functioning autism. *Journal of Autism and Developmental Disorders, 36*, 395–400.

Shields, A., & Cicchetti, D. (1997). Emotion regulation among school-age children: The development and validation of a new criterion Q-sort scale. *Developmental Psychology, 33*, 906–916. https://doi.org/10.1037/0012-1649.33.6.906

Shields, A., & Cicchetti, D. (2001). Parental maltreatment and emotion dysregulation as risk factors for bullying and victimization in middle childhood. *Journal of Clinical Child Psychology, 30*, 349–363. https://doi.org/10.1207/S15374424JCCP3003_7

Smith-Myles, B. S., & Adreon, D. (2001). *Asperger syndrome and adolescence: Practical solutions for school success*. Shawnee Mission, KS: Autism and Asperger Publishing.

Sofronoff, K., Attwood, T., & Hinton, S. (2005). A randomized controlled trial of a cognitive behavioural intervention for anxiety in children with Asperger syndrome. *Journal of Child Psychology and Psychiatry, 46*, 1152–1160.

Sofronoff, K., Attwood, T., Hinton, S., & Levin, I. (2007). A randomized controlled trial of a cognitive behavioural intervention for anger management in children diagnosed with Asperger syndrome. *Journal of Autism and Developmental Disorders, 37*, 1203–1214. https://doi.org/10.1007/s10803-006-0262-3

Southam-Gerow, M. A., & Kendall, P. C. (2002). Emotion regulation and understanding: Implications for child psychopathology and therapy. *Clinical Psychology Review, 22*, 189–222.

Spek, A. A., Van Ham, N. C., & Nyklíček, I. (2013). Mindfulness-based therapy in adults with an autism spectrum disorder: A randomized controlled trial. *Research in Developmental Disabilities*, *34*, 246–253.

Stewart, M. E., Barnard, L., Pearson, J., Hasan, R., & O'Brien, G. (2006). Presentation of depression in autism and Asperger syndrome: A review. *Autism, 10*(1), 103–116.

Stringaris, A., & Goodman, R. (2009). Mood lability and psychopathology in youth. *Psychological Medicine, 39*, 1237–1245. https://doi.org/10.1017/S0033291708004662

Suveg, C., & Zeman, J. (2004). Emotion regulation in children with anxiety disorders. *Journal of Clinical Child and Adolescent Psychology, 33*, 750–759.

Thompson, R. A. (1991). Emotional regulation and emotional development. *Educational Psychology Review, 3*, 269–307.

Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. *Monographs of the Society for Research in Child Development, 59*(2), 25–52. https://doi.org/10.1111/1540-5834.ep9502132762

Thompson, R. A., Lewis, M. D., & Calkins, S. D. (2008). Reassessing emotion regulation. *Child Development Perspectives, 2*, 124–131.

Thomson, K., Riosa, P. B., & Weiss, J. A. (2015). Brief report of preliminary outcomes of an emotion regulation intervention for children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 45*, 3487–3495.

Tomchek, S. D., & Dunn, W. (2007). Sensory processing in children with and without autism: A comparative study using the Short Sensory Profile. *American Journal of Occupational Therapy, 61*, 190–200.

Tugade, M. M., & Fredrickson, B. L. (2007). Regulation of positive emotions: Emotion regulation strategies that promote resilience. *Journal of Happiness Studies, 8*, 311–333. https://doi.org/10.1007/s10902-006-9015-4

Ungerer, J. A., Dolby, R., Waters, B., Barnett, B., Kelk, N., & Lewin, V. (1990). The early development of empathy: Self-regulation and individual differences in the first year. *Motivation and Emotion, 14*, 93–106. https://doi.org/10.1007/BF00991638

van Steensel, F. J., Bögels, S. M., & de Bruin, E. I. (2013). Psychiatric comorbidity in children with autism spectrum disorders: A comparison with children with ADHD. *Journal of Child and Family Studies, 22*, 368–376.

van Steensel, F. J., Bögels, S. M., & Perrin, S. (2011). Anxiety disorders in children and adolescents with autistic spectrum disorders: A meta-analysis. *Clinical Child and Family Psychology Review, 14*, 302–317.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063–1070.

Watson, L. R., Baranek, G. T., Crais, E. R., Reznick, J. S., Dykstra, J., & Perryman, T. (2007). The first year inventory: Retrospective parent responses to a questionnaire designed to identify one-year-olds at risk for autism. *Journal of Autism and Developmental Disorders, 37*, 49–61.

Weiss, J. A. (2014). Transdiagnostic case conceptualization of emotional problems in youth with ASD: An emotion regulation approach. *Clinical Psychology: Science and Practice, 21*, 331–350.

Weiss, J. A., Thomson, K., Burnham Riosa, P., Albaum, C., Chan, V., Maughan, A., . . . Black, K. (2018). A randomized waitlist-controlled trial of cognitive behavior therapy to improve emotion regulation in children with autism. *Journal of Child Psychology and Psychiatry, 59*, 1180–1191.

White, S. W., Ollendick, T., Albano, A. M., Oswald, D., Johnson, C., Southam-Gerow, M. A., . . . Scahill, L. (2013). Randomized controlled trial: Multimodal anxiety and social skill intervention for adolescents with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 43*, 382–394.

White, S. W., Ollendick, T., Scahill, L., Oswald, D., & Albano, A. M. (2009). Preliminary efficacy of a cognitive-behavioral treatment program for anxious youth with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *39*, 1652–1662.

Wood, J. J., Drahota, A., Sze, K., Har, K., Chiu, A., & Langer, D. A. (2009). Cognitive behavioral therapy for anxiety in children with

autism spectrum disorders: A randomized, controlled trial. *Journal of Child Psychology and Psychiatry, 50*, 224–234.
Yirmiya, N., Gamliel, I., Pilowsky, T., Feldman, R., Baron-Cohen, S., & Sigman, M. (2006). The development of siblings of children with autism at 4 and 14 months: Social engagement, communication, and cognition. *Journal of Child Psychology and Psychiatry, 47*, 511–523.
Zelazo, P. D., & Cunningham, W. A. (2007). Executive function: Mechanisms underlying emotion regulation. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 135–158). New York, NY: Guilford Press.
Zeman, J. L., Cassano, M., Suveg, C., & Shipman, K. (2010). Initial validation of the Children's Worry Management Scale. *Journal of Child and Family Studies, 19*, 381–392.
Zeman, J., Shipman, K., & Penza-Clyve, S. (2001). Development and initial validation of the Children's Sadness Management Scale. *Journal of Nonverbal Behavior, 25*, 187–205.
Zwaigenbaum, L., Bryson, S., Rogers, T., Roberts, W., Brian, J., & Szatmari, P. (2005). Behavioral manifestations of autism in the first year of life. *International Journal of Developmental Neuroscience, 23*, 143–152.