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The role of antecedent-focused emotion regulatory strategies on emotionally dysregulated behavior above and beyond the influence of ADHD.

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The Role of Antecedent-Focused Emotion Regulatory Strategies on Emotionally Dysregulated Behavior Above and Beyond the Influence of ADHD

By

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Emotion Regulation

Emotion regulation is a multifaceted dynamic process by which physiological, behavioral, and emotional reactions are modified in an individual to effectively meet internal and external demands (Cole et al., 2004; Gross & Thompson, 2007). According to a process model of emotion regulation (figure 1), emotion regulation may occur along several points during the emotion-generative process (Gross, 1998). Regulatory strategies in a process model of emotion regulation may be classified as either antecedent-focused, occurring before patterns of response to emotions begin, (situation selection, situation modification, attentional deployment, and cognitive change/reappraisal), or response focused, occurring after the emotional response tendencies are underway, (response modulation; Gross 2001). Emotion dysregulation occurs when facets of these adaptive processes are impaired or are wholly ineffective, resulting in behaviors that are not appropriate for internal needs or situational expectations (Shaw, Stingaris, Nigg, & Leibenluft, 2014). The adaptiveness of a regulatory strategy is highly situationally dependent. In some cases, for example, displays of intense positive or negative emotion may be contextually appropriate, while in others, they are not. When an individual's emotional variability and intensity are dysregulated and are not appropriate to the situation, it often leads to negative outcomes (Cole, Michel, & Teti, 1994). Emotion dysregulation can yield negative consequences for an individual affectively, behaviorally, cognitively, and socially and is also thought to confer vulnerability to a host of internalizing and externalizing psychopathological outcomes (Gross, 2002; Cole, Hall, & Hajal, 2013; Beauchaine, 2001)

Emotion Dysregulation in Children

While emotion dysregulation is a transdiagnostic factor common to both child and adult psychopathology (Cole, Michel, & Teti, 1994; Gross, 2002), the resulting affective, cognitive, and social impairments may be of additional concern in children due to the importance of these domains to adaptive development and the honing of inhibitory skills over the lifespan. Children who struggle with emotion regulation may react strongly to emotional stimuli so that reactions feel inseparable from the emotions themselves (Gratz & Tull, 2010). Although both positive and negative emotions may be dysregulated, the problems associated with a failure to effectively regulate negative emotions (e.g. anger, sadness, and worry), are especially well-documented in psychopathological literature. Children who under-regulate negative emotions self-report internalizing symptoms more frequently and tend to generate more parent and peer reports of internalizing and externalizing problems than those with well-regulated negative emotions (Hagglund, et al., 1994; Zeman, Shipman, & Suveg, 2002). Research suggests that these children are at an increased risk for the development of internalizing disorders such as depression and anxiety (Kovacs et al. 2008; Zeman et al. 2002). Children who under-regulate negative emotions are also more likely to engage in physically aggressive behaviors (Roberton, Daffern, & Bucks 2012), and have been found to be at risk for impaired social functioning (Rosen, Milich, & Harris, 2009).

Emotion Dysregulation in ADHD

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder frequently characterized by combinations of difficulties with attention, impulsiveness, and hyperactivity (APA, 2013). These hallmark characteristics are additionally often accompanied by under-regulation of negative emotions and failure to inhibit responses to emotional stimuli, a

pattern which has proven to be related to a variety of problems in children. Emotion dysregulation in children with ADHD often occurs in the form of intense and unpredictable changes in emotion known as emotional lability (Sobanski et al., 2010). Due to the known detriments of contextually inappropriate displays of negative emotion, emotionally labile children are more likely to encounter problems related to these displays of negative emotions in what may be viewed as unwarranted situations. Children with ADHD diagnoses endorsing more impulsivity symptoms often tend to display greater disinhibition and are also less effective at regulating emotion when compared to typically-developing peer control groups (Walcott & Landau, 2004). In acknowledgement of the prominent consequences of emotion dysregulation and the presence of emotion dysregulation in many cases of ADHD, several studies regarding response-focused regulation of emotion have been conducted. Fewer studies, however, have investigated specific effects of impairments in the Process model's antecedent-focused strategies such as situation selection, situation modification, attentional deployment, and cognitive change/reappraisal.

Emotional Awareness

Emotional awareness refers to the attentional process by which individuals monitor, identify, and differentiate between their emotions (Rieffe et al. 2008). This ability to identify one's own emotions is an important aspect of the emotion regulation process, often cited as a prerequisite to adaptive emotion regulation (Lambie & Marcel, 2002). Adequate emotional awareness abilities allow for individuals to more easily recognize the emotion that they're experiencing so that they may initiate the appropriate regulation and coping strategies. Deficits in emotional awareness have been recognized as a contributing factor in the development of maladaptive regulation and the expression of negative affect (Halberstadt et al., 2001). There has

been little research examining differences in emotional self-awareness among children with and without ADHD. However, research within an ADHD population suggests that children who are deficient in emotional awareness are more likely to meet criteria for a comorbid externalizing disorder (Factor, Rosen, Reyes, 2013). This suggests that ADHD populations may be especially vulnerable to the effects of emotion awareness deficits.

Situationally Appropriate Emotional Expression

Adaptive expression of positive or negative emotion in a situation is largely contingent upon an individual's ability to accurately evaluate and empathize with the emotional context of the scene. Factors such as emotion recognition and other forms of nonverbal communication have often been identified as important precursors to the development of healthy patterns of social and psychological functioning (Carton, Kessler, & Pape, 1999). For example, children who are unwilling or unable to express their emotions appropriately may experience interpersonal strain and may create more adverse social environments during the situation selection stage of emotion regulation. Additionally, children who are unable to appropriately express emotion may be unable to modify their environment if it is distressing during the situation modification stage of the Process model (Gross, 1998). Due to the importance of understanding emotional context and expressing emotion accordingly to social functioning, research has often been conducted to assess social sensitivity and socially appropriate emotional responding in social situations under the construct of situational responsiveness. Research in this domain has shown that more than half of children with ADHD score in the 25th percentile or below for situational responsiveness when compared to the scores of typically developing peers (59% in females, 51% in males; Bunford, Evans, & Wymbs 2015). Findings such as these may be important to investigate further as children with ADHD have been found to exhibit significant

deficits in external social cues such as the recognition of negative emotions, while also reporting greater numbers of interpersonal problems (Pelc et al., 2006). Additional research suggests that children with ADHD may also require more time to interpret the emotions of others, however even with increased time they may not necessarily improve in accuracy (Kats-Gold, Besser, & Priel, 2007). The difficulty some children with ADHD demonstrate with identifying emotions of others accurately within the timeframe of an interaction may compound and result in dysregulated emotional and behavioral responses which are not appropriate to the situation. While little research has been published regarding the effects of impaired situational responsiveness in typically developing populations, the inability to accurately gauge these types of nonverbal environmental cues may result in contextually unwarranted expression of emotions and place strain on interpersonal relationships in any population.

The Present Study

This study aims to investigate the relationship between deficits in emotional awareness, situational responsiveness, and emotion regulation in children with and without ADHD. In consideration of the gap in the literature investigating factors associated with antecedent-focused regulation such emotional awareness and emotional situation responsiveness, the following hypotheses have been postulated:

Hypothesis 1: Children demonstrating larger deficits in emotional awareness will demonstrate greater emotion dysregulation above and beyond the influence of ADHD.

Hypothesis 2: Children demonstrating larger deficits in emotional situational responsiveness will demonstrate greater emotion dysregulation above and beyond the influence of ADHD. .

Exploratory hypothesis: Exploratory analyses will be conducted in order to examine the relation of emotion awareness and emotion responsiveness to emotion specific regulation. However, as this is a novel area of research, no specific directional hypotheses are posited.

Method

Participants

A total of 288 children (173 boys, 115 girls) ages 7 to 12 years and their families were evaluated in the current study. Of the children in the study, 171 children met criteria for ADHD and 107 did not. Families were recruited for the study through the distribution of fliers at local schools in a Midwestern metropolitan area.

Measures

Diagnostic Structured Interview for Children (DISC; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). The DISC-P was used to assess the ADHD status of children participating in this study. The DISC-P is a well-validated parent-report interview of psychopathology in children that has clinical and research utility.

Emotion Regulation Index for Children and Adolescents (ERICA; MacDermott, Gullone, Allen, King, & Tonge, 2010*).* The ERICA is a self-report adaptation of the Emotion Regulation Checklist (ERC) which is designed to assess children's perceptions of their ability to regulate and manage their emotions. The ERICA consists of 16-items on which children are asked to rate their emotion regulation on a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree". The ERICA yields a general composite score and three subscales: Emotional Control, Emotional Self-Awareness, and Situational Responsiveness. The Situational Responsiveness subscale and the Emotional Self-Awareness subscales of the ERICA were used to measure situational responsiveness and emotional self-awareness, respectively. The Emotional Control

subscale was not used in this study as it was not relevant to the study hypotheses. The ERICA has been validated in the age-range of the children participating in this study (MacDermott et al., 2010).

Emotion Regulation Checklist (ERC; Shields & Cicchetti) The ERC is a 24-item parent-report questionnaire that assesses parents' perceptions of their children's emotional negativity and emotion regulation abilities. Parents are asked to rate their child on a four-point Likert scale regarding their child's emotional responses, and responses yield two subscales: Emotional Negativity and Emotion Regulation Difficulties. The ERC has been used to assess emotion regulation in a wide variety of studies and has demonstrated substantial reliability and validity in previous studies.

Children's Emotional Management Scale - Parent Report (CEMS-P; Zeman, Cassano, Suveg, & Shipiman, 2010; Zeman, Shipman, & Penza-Clyve, 2001). The CEMS is a 33-item measure of children's ability to regulate negative emotions including anger, sadness, and worry. The CEMS consists of parallel child self-report and parent report forms that asks parents and children to rate on a 3-point scale ("hardly ever," "sometimes," "often") the extent to which children inhibit, express, and manage negative emotions. The CEMS consists of 3 sub-forms, 1 for each negative emotion (anger, sadness, and worry). Each sub-form additionally yields three subscales: Inhibition, Dysregulation, and Coping. Only the dysregulation subscale for each emotion was used for the purposes of this study. The CEMS has been extensively validated with children in the age range of the proposed study (Zeman et al., 2001).

Procedures

Baseline session**.** Parents of child participants provided informed consent and the children provided assent before participating in the procedures prepared for the baseline session.

Following informed consent and assent, parents completed the DISC to assess whether their child met criteria for ADHD. During this session, the parents and child also completed questionnaires about the internalizing and externalizing behaviors of the child, as well as questionnaires about the child's emotion regulation. Compensation for attending the baseline session was a $5 gift card.

Results

Bivariate correlation analysis

Bivariate correlations (table 1) were conducted to assess the relationships between emotion dysregulation and situational responsiveness, emotional self-awareness, age, sex, ADHD medications, and ADHD status. Significant positive correlations to emotion dysregulation were observed in situational responsiveness (r = .18, p < *.01),* emotional self-awareness, (r = .18, p < .01), ADHD diagnostic status (r = .453, p <.01), and ADHD medications (r = .383, p < .01), indicating that greater parental ratings of emotion dysregulation were related to higher scores in situational responsiveness, higher emotional self-awareness, having ADHD, and the child being on ADHD medication. A significant negative correlation was also seen for Age (r = -.151, p = .01) indicating that younger children were related to higher emotion dysregulation. Sex was found to not be significant in this analysis.

Estimation of Emotion Dysregulation from Situational Responsiveness and Emotional Self-Awareness

A hierarchical regression analysis (table 2) was utilized to determine the unique variance of the variables of interest in relation to emotion dysregulation. ADHD medication status and age were entered into the first step of the model as covariates to control for their known influence on emotion dysregulation based on the bivariate correlation analysis. The second step included

ADHD diagnostic status to allow for the third step of the regression to more accurately assess the influence of emotional self-awareness and emotional situational responsiveness on emotion dysregulation above and beyond the influence of ADHD. This step was determined to be significant but individual predictors were not, suggesting that both emotional self-awareness and emotion situational responsiveness contribute through shared variance rather than through unique variance of either one.

Results of the hierarchical regression analysis suggest mixed support for hypotheses one and two. Specifically, the emotional awareness variables contributed significant variance collectively to the estimation of emotion regulation, but neither situational responsiveness nor emotional self-awareness uniquely contribute to emotion dysregulation above and beyond the influence of ADHD. Examination of the covariates in step one suggested that they contributed significant variance to the estimation of emotion dysregulation ($\Delta R^2 = .18$, $p<.01$). Step two of the regression, including ADHD diagnostic status, was also significant in this regard ($\Delta R^2 = .09$, $p<.01$). The final step, including Emotional Self-awareness and Situational Responsiveness was significant ($\Delta R^2 = .02$, $p<.05$). However, neither Emotional Self-Awareness nor Situational Responsiveness appear to individually account for significant variance in ratings of emotion dysregulation above and beyond the influence of ADHD when also accounting for age and ADHD medication use, however the constructs do appear to share accountability for significant variance when examined together.

Exploratory Analysis of Emotion-Specific Regulation

Exploratory analyses were conducted using the emotion-specific (anger, sadness, and worry) dysregulation scales of the CEMS. For anger dysregulation (table 3), although the overall step was marginally significant ($\Delta R^2 = .023$, $p= .052$), analysis of individual predictors suggested

that Emotional Self-awareness significantly estimated anger dysregulation above and beyond ADHD ($\beta = .158$, $t = 2.4$, $p < .05$). Specifically, poorer emotional self-awareness was linked to greater dysregulation of anger. For sadness (table 4), Situational Responsiveness was significant ($\beta = -.131$, $t = -2.07$, $p < .05$). Situational Responsiveness was also significant for worry, (table 5; $\beta = -.142$ $t = -2.07$, $p < .05$).

Discussion

Deficits in emotion regulation can yield negative outcomes for children both with and without ADHD. Gross's Process model highlights the multifaceted nature of emotion regulation and suggests that antecedent-focused regulation may be equally important to more overt downstream response-focused regulatory strategies. Given the role of emotional regulation in children's cognitive and social development and the gap in the literature regarding the contributions of specific aspects of antecedent-focused regulation, this study sought to investigate the relationships between emotional awareness, situationally appropriate emotional expression, and emotion dysregulation above and beyond the influence of ADHD diagnostic status. Specifically, secondary data analysis was conducted on a sample of 288 children, examining baseline session data consisting of ADHD status, emotion regulation, emotional self-awareness, and situationally appropriate emotional expression.

Findings and Theoretical Implications

Hierarchical regression analysis provided mixed support for hypotheses 1 and 2. While the step including both situational responsiveness and emotional self-awareness in the estimation of emotion dysregulation was significant, individual predictors were not. This suggests that while emotional self-awareness and situationally appropriate emotional expression together contribute to the estimation of emotion regulation, neither variable contributed unique variance above and

beyond the other variable. Additionally, exploratory analyses were conducted to examine the effects of emotional self-awareness and situationally appropriate emotional expression on regulation of specific emotions (anger, worry, and sadness). Deficient emotional self-awareness was found to be a significant predictor of anger dysregulation while deficiencies in situationally appropriate emotional expression were found to be a significant predictor of worry and sadness dysregulation. Overall, this suggests that poor awareness of one's own emotion state was uniquely linked with greater dysregulated anger, while difficulty expressing emotion in a situationally appropriate manner was uniquely linked with dysregulation of "internalizing" emotions (sadness and worry).

This was an exploratory hypothesis as few studies to date have examined differences in the dysregulation of specific emotions, and thus there was not sufficient evidence to predict the direction of effects. However, these findings are consistent with Gross's Process model (Gross, 1998). The Process model incudes situation selection and situational modification as antecedent-focused emotion regulation strategies. Children who have poor emotional awareness may be less likely to avoid upsetting situations because they are not aware of when situations are making them upset. This might lead to more anger, as they are more likely to be in anger-provoking situations. However, children who have poor situationally appropriate emotional expression may not be able to appropriately express emotions in a way that would positively modify situations and allow them to reduce distress, which in turn makes it harder to regulate worry and sadness. However, as this was an exploratory hypothesis in a cross-sectional study, further research is needed to confirm this effect. While current literature largely suggests that children with ADHD often exhibit difficulties regulating emotion, this study lends support to a process model of

emotion regulation in which shortcomings of upstream processes may yield negative downstream consequences above and beyond the influence of ADHD.

Clinical Implications

The results of the study suggest that emotion dysregulation may be significantly impacted by deficits in emotional self-awareness and situationally appropriate emotional expression. Exploratory analyses additionally provide important information regarding the regulation of specific emotions. Clinically speaking, this may provide valuable information regarding the design of psychosocial and behavioral interventions for children both with and without ADHD. As it currently stands, therapies for children with ADHD largely emphasize behavioral modification in conjunction with prescription stimulant medication (Chronis, Chacko, Fabiano, Wymbs & Pelham, 2004). While treatment following this structure may be effective in the treatment of the core symptoms of ADHD, these treatments may not necessarily improve deficits in emotion dysregulation and few treatments for children with ADHD currently target the emotion dysregulation symptoms which often accompany the hallmark conditions of the disorder. Emerging treatments, however, such as Managing Frustrations for Children (Rosen et al., 2018) targets emotion dysregulation in children with ADHD in a group setting. This type of treatment includes modules for both antecedent-focused and response-focused emotion regulation skills. Such antecedent-focused skills include emotion recognition, identification and restructuring of emotional cognition, and recognition of triggers, while response-focused skills include coping strategies to assist in physiological downregulation (i.e. progressive muscle relaxation, diaphragmatic breathing) to express emotion in situationally appropriate ways. In terms of individual treatment, it may be possible to utilize the observed trends to improve treatment fit by directly targeting these key elements of emotion regulation in children with and

without ADHD. For instance, in children with poor anger regulation, clinicians may target poor emotional self-awareness while in children with sadness and worry regulation, clinicians may target situationally appropriate emotional expression. The present evidence suggests that more thorough assessment in clinical practice is required to understand the difficulties exhibited by clients and to tailor treatments accordingly.

Limitations

The present study provides a preliminary examination at the role of upstream emotion-regulation processes in both the general regulation of emotion in children as well as the specific regulation of anger, sadness, and worry above and beyond the influence of ADHD. However, several limitations for this study must be taken into consideration. All measures used for the present study were self-report or parent-report retrospective measures. Such measures are susceptible to biases. Children with ADHD have been known to exhibit positive illusory bias, and trend which results in them rating themselves as better or more competent that other data or actual performance would indicate. This bias is often seen in self-report ratings in areas such as academic performance, behavioral performance, and social skills or behavior (Volz-Sidiropoulou, Boecker, & Gauggel, 2016). As it relates to this study, this would suggest that children with ADHD would also tend to report having greater emotion regulation abilities than they do, although insufficient research has been done in this area. Additionally, Sato and Kawahara (2010) reported that retrospective reports of negative emotional states are often more exaggerated than in-the-moment reports of the same state. Therefore, the present reports by children may be an underestimation of their true deficits, while parent-reports, conversely, may be an overestimation. Secondly, the ERICA's situational responsiveness subscale was the best fit for the construct of situationally appropriate emotional expression given the available data,

but it may have also been beneficial to the understanding of children's comprehension of situational appropriateness by including a task of emotion recognition. Additionally, all data was collected in a cross-sectional design. While the current study demonstrated that emotional awareness and situationally-appropriate emotional expression significantly estimated emotion regulation, the direction of effect can not be determined in a cross-sectional study. Emotion regulation was the dependent variable in this study, but it is possible that emotion regulation may actually predict emotional awareness and situationally-appropriate emotional expression instead. Future studies are needed using a longitudinal design to determine direction of effect.

Conclusions

Emotion dysregulation in children may contribute to poor interpersonal relationships and a variety of internalizing and externalizing psychopathological outcomes in children both with and without ADHD. This study serves to provide an examination of how emotional self-awareness and situationally appropriate emotional expression may affect an individual's ability to broadly regulate emotion and additionally provides an exploratory investigation of how these attributes may affect specific emotion regulation.

The present study found that emotional self-awareness and emotion recognition may both contribute to emotion regulation through shared variance with each other rather than unique variance of either one. Exploratory analyses of regulation of specific emotion suggested that children displaying greater difficulties with emotional self-awareness may experience more difficulty regulating anger, and children with difficulties with situationally appropriate expression of emotion may have greater difficulty regulating sadness and worry. By continuing research in this domain, it may be possible to design interventions for children prone to emotion

dysregulation which are more individualized to fit the child's specific symptomatology.

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Appendix A

Figure 1.

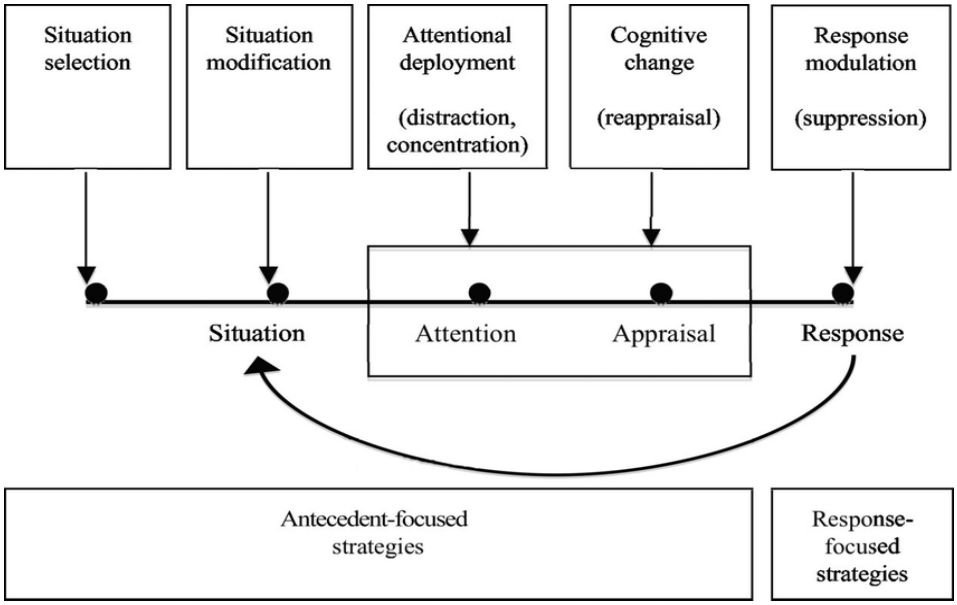

Figure 1. The process model of emotion regulation. Adapted from " Emotion Regulation: Conceptual Foundations, " by J. J. Gross and R. A. Thompson, in J. J. Gross (Ed.), Handbook of Emotion Regulation (p. 10), 2007, New York, NY: Guilford Press. Copyright 2007 by Guilford Press. Adapted with permission by Webb, T., Webb, M., Paschal, E., Paschal, T. (2012).

Table 1. *Summary of bivariate correlations.*

Measures	SR	ESA	Age	Sex	ADHD Meds	ADHD
ERC Total	.181**	.180**	.151*	-.081	.383**	.453**

Note: * $p < .05$, ** $p<.01$
SR = Situational Responsiveness; ESA = Emotional Self Awareness; ERC Total = Emotion Dysregulation

Table 2. *Summary of hierarchical regression: Emotional Regulation Not Individually Estimated by Situational Responsiveness or Emotional Self Awareness.*

Step/Variable	R^2	ΔR^2	*B*	*SE B*	*t*	*β*
Step 1	.418	.418				
Age			-.052	.017	-2.993	-.169**
Stimulant medication treatment (No = 0, Yes =1)			.398	.057	6.988	.395***
Step 2	.267	.092				
ADHD (Non-ADHD = 0, ADHD = 1)			.291	.051	5.699	.332***
Step 3	.284	.018				
Emotional Self Awareness			.011	.007	1.642	.091
Situational Responsiveness			.015	.009	1.577	.086

Note: ** = $p < .01$, *** = $p < .001$

Table 3. *Summary of hierarchical regression: Dysregulated Anger Expression Best Estimated by Emotional Self Awareness.*

Step/Variable	R^2	ΔR^2	*B*	*SE B*	*t*	*β*
Step 1	.035	.035				
Age			-.145	.077	-1.879	-.120
Stimulant medication treatment (No = 0, Yes =1)			.600	.250	2.396	.153*
Step 2	.057	.022				
ADHD (Non-ADHD = 0, ADHD = 1)			.569	.243	2.343	.161*
Step 3	.080	.023				
Emotional Self Awareness			.078	.032	2.282	.158*
Situational Responsiveness			-.004	.043	-.101	.007

Note: * = $p < .05$, ** = $p < .01$, *** = $p < .001$

Table 4. *Summary of hierarchical regression: Dysregulated Sadness Expression Best Estimated by Situational Responsiveness.*

Step/Variable	R^2	ΔR^2	*B*	*SE B*	*t*	*β*
Step 1	.061	.061				
Age			-.253	.072	-3.530	-.221***
Stimulant medication treatment (No = 0, Yes =1)			.486	.232	2.097	.131*
Step 2	.100	.039				
ADHD (Non-ADHD = 0, ADHD = 1)			.718	.223	3.213	.215**
Step 3	.116	.016				
Emotional Self Awareness			.020	.030	.655	.042
Situational Responsiveness			-.083	.040	-2.072	-.131*

Note: * = $p < .05$, ** = $p < .01$, *** = $p < .001$

Table 5. *Summary of hierarchical regression: Dysregulated Worry Expression Best Estimated by Situational Responsiveness.*

Step/Variable	R^2	ΔR^2	*B*	*SE B*	*t*	*β*
Step 1	-.054	.054				
Age			-.240	.074	-3.268	-.217***
Stimulant medication treatment (No = 0, Yes =1)			.349	.239	1.462	.097
Step 2	.060	.019				
ADHD (Non-ADHD = 0, ADHD = 1)			.501	.236	2.121	.166*
Step 3	.071	.019				
Emotional Self Awareness			.025	.031	.798	.055
Situational Responsiveness			-.087	.042	-2.066	-.142*

Note: * = $p < .05$, ** = $p < .01$, *** = $p < .001$