J Abnorm Child Psychol (2018) 46:1351–1358
https://doi.org/10.1007/s10802-017-0365-7

Differences in Emotion Regulation Difficulties Across Types of Eating Disorders During Adolescence

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Published online: 4 November 2017

Abstract Emotion regulation appears to play a key role in eating disorders. However, prior attempts to associate specific emotion regulation abilities with specific types of eating disorders resulted in inconsistent findings. Moreover, far less is known about emotion regulation in eating disorders during adolescence, a critical period of emotional development. The current study addresses this gap, comparing emotion regulation characteristics between adolescents with restrictive types of eating disorders and those with binge eating or purging types of eating disorders. Ninety-eight adolescents with eating disorders (49 with restrictive and 49 with binge eating/purging eating disorders) completed a set of questionnaires including the Difficulties in Emotion Regulation Scale (DERS). The results revealed that binge eating/purging types of eating disorders were associated with greater difficulties in a variety of emotion regulation dimensions including impulse control, goal-directed behavior and access to effective emotion regulation strategies. Awareness and clarity of emotions were also worse in the binge eating/purging types of eating disorders, but this difference did not remain when comorbid psychopathology measures were controlled for. Moreover, the emotion regulation profile of adolescents with anorexia nervosa-binging/purging type was more similar to that of adolescents with bulimia nervosa than to that of adolescents with anorexia nervosa-restrictive type. While both restrictive and binge eating/purging eating disorders have been associated with emotion regulation difficulties, the current study shows that the presence of binge eating or purging episodes is linked with greater severity of emotion regulation deficits among adolescents with eating disorders.

Keywords Emotion regulation · Eating disorders · Adolescence · DERS

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Introduction

Eating disorders (EDs) refer to a group of psychiatric conditions in which disordered eating or eating behaviors result in impaired psychological functioning or physical health (American Psychiatric Association 2013). Disordered eating can take many shapes such as severe restriction of food intake that results in rapid weight loss (as in the case of anorexia nervosa) or episodes of binge eating which may lead to compensatory behaviors such as vomiting or use of laxatives (as is the case in bulimia nervosa and anorexia nervosa – binge eating/purging type).

Individuals with eating disorders suffer from elevated negative emotionality (e.g., Engel et al. 2013; Waller et al. 2003). Emotion regulation (ER) abilities are required to cope effectively with negative emotions. Studies report that patients with EDs have considerable difficulties regulating their emotions (for review see Lavender et al. 2015). Emotion dysregulation was suggested to contribute to the development and maintenance of EDs (Lavender et al. 2015). However, ER is a complex theoretical construct that entails different behavioral and cognitive characteristics.

In attempt to disentangle ER into several key aspects, Gratz and Roemer (2004) suggested four ER dimensions: (1) goal-directed behavior and impulse control; (2) awareness and

understanding of emotions; (3) acceptance of emotional responses; and (4) availability of ER strategies perceived as effective. Impairment on these dimensions was reported in adults with EDs compared to healthy controls (e.g., Brockmeyer et al. 2014; Gilboa-Schechtman et al. 2006; Harrison et al. 2010; Svaldi et al. 2012). However, previous attempts to examine whether the ER profile differs as a function of the specific ED type resulted in inconsistent findings. A potential reason for these inconsistencies may be the previous focus on ED diagnosis rather than the abnormal eating behavior which can be similar across different types of EDs. Specifically, previous research suggests that the presence or absence of binge eating or purging may be particularly important in determining ER difficulties as we discuss below.

Goal directed behavior and impulse control

Studies that investigated neuropsychological functioning in EDs in the context of non-emotional stimuli often associated difficulty engaging in goal-directed behavior and preventing impulsive behavior with EDs characterized by binge eating or purging behaviors such as bulimia nervosa (BN) and anorexia nervosa – binge eating/purging type (AN-BP; e.g., Lock et al. 2011; Rosval et al. 2006).

However, in the context of ER, several studies failed to find differences between adults with AN and BN in goal-directed behavior and impulse control (Harrison et al. 2010; Svaldi et al. 2012). Nevertheless, these studies did not differentiate patients with the restrictive type of AN (AN-R) that does not involve binge eating/purging behaviors and patients with AN-BP that is characterized by reoccurring binge eating and/or purging episodes. Other studies revealed greater impulse control deficits in adults with AN-BP compared to those with AN-R (Brockmeyer et al. 2014; Rowsell and MacDonald 2016). The only difference between these subtypes of AN is the presence vs. absence of binge eating/purging behaviors. This suggests that the type of abnormal eating behavior may be more important in determining ER problems than the primary ED Diagnosis.

Awareness and understanding emotions

Unlike goal-directed behavior and impulse control, difficulties in awareness and understanding emotions have been suggested to be more prominent in patients with AN than BN (for review see Nowakowski et al. 2013). Support for this suggestion has been inconsistent. While several studies reported no differences in awareness and clarity of emotions between adults with restrictive and those with binge eating/purging EDs (Brockmeyer et al. 2014; Ruscitti et al. 2016; Svaldi et al. 2012), others reported less emotional clarity in patients with AN compared to patients with BN (Gilboa-Schechtman et al. 2006) and that adults with AN-R have greater difficulty identifying, recognizing and expressing emotions than those with AN-BP (Corcos et al. 2000; Harrison et al. 2010; Schmidt et al. 1993). This is yet more evidence suggesting that abnormal eating behaviors (e.g., binge eating/purging or restrictive eating) may be more indicative of specific ER problems than ED diagnosis.

Acceptance of emotions

Difficulty in accepting negative emotions was frequently reported in both restrictive and binge eating/purging EDs compared to healthy controls. Few studies compared ED types on this ability, but most suggested no significant difference between adults with AN-R, AN-BP and BN in acceptance of emotions (Brockmeyer et al. 2014; Svaldi et al. 2012). Therefore, evidence thus far suggests that difficulty accepting negative emotions may be a transdiagnostic feature in EDs that does not change as a function of the disordered eating behaviors.

Availability of emotion regulation strategies

There is also little evidence showing that access to effective ER strategies differs across ED types (Brockmeyer et al. 2014; Svaldi et al. 2012). However, a recent study demonstrated that adults with AN-BP report less availability of emotion regulation strategies than those with AN-R (Rowsell and MacDonald 2016). This suggests that patients with binge eating/purging behaviors feel that they have less means available to regulate their emotions and emphasizes the potential role of binge eating/purging behaviors as non-adaptive ways to regulate negative emotions. In support of this hypothesis, adults with binge eating/purging behaviors reported less use of adaptive emotion regulation strategies, such as cognitive reappraisal, compared to patients with restrictive EDs (Danner et al. 2012). These studies also suggest that when assessing ER in EDs, the presence or absence of binge eating/purging behaviors is more meaningful in determining ER problems than specific ED diagnosis.

The current study

Overall, existing literature is inconsistent regarding differences on specific ER abilities among different types of EDs. Nevertheless, the presence or absence or binge eating/purging behaviors may be a critical variable that differentiates ED types on several key ER dimensions. Therefore, when assessing ER in EDs, it seems important to treat restrictive vs. binge eating/purging EDs as separate groups, rather than focus on specific ED diagnosis which may combine binge

eating/purging and restrictive EDs in the same diagnostic group (e.g., AN-R and AN-BP) or treat different diagnoses that share the same pathological eating behaviors as separate groups (e.g., AN-BP and BN).

Another important limitation of previous research is that all previous studies so far were conducted on samples of adults. To the best of our knowledge, no previous study assessed ER in different types of EDs during adolescence. This is somewhat surprising considering that EDs most often begin during adolescence which is also a critical period for developing ER skills (e.g., Neumann et al. 2010).

The current study assessed potential differences in ER abilities between adolescents with binge eating/purging and restrictive EDs. We used the Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer 2004) to assess ER on the ER dimensions suggested by Gratz and Roemer. We hypothesized that (1) adolescents with binge eating/purging EDs would report greater difficulties engaging in goal-directed behavior and controlling impulses than adolescents with restrictive EDs; (2) adolescents with restrictive EDs would report less awareness and clarity of emotions than adolescents with binge eating/purging EDs; (3) no group differences were expected in measures of non-acceptance of emotions. Lastly, (4) adolescents with binge eating/purging EDs were expected to report less access to ER strategies than adolescents with restrictive EDs.

Methods

Participants

The study included 98 adolescents with a diagnosis of an ED (4 males) in the age range of 12-20 years old (Table 1 presents demographic and clinical variables). This age range represents a span from early adolescence through late adolescence (Spear 2000). The data were collected from the Eating Disorders Treatment Unit at the Child and Adolescents Psychiatry Department at Soroka Medical Center in Beer-Sheva, Israel. Diagnoses were made based on the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (American Psychiatric Association 2013) criteria following a clinical intake interview with psychiatrists with expertise in child and adolescent EDs. Following the interview, two other expert clinicians reviewed the medical record and verified the diagnosis. Five patients for which there was disagreement regarding the specific type or subtype of the EDs were excluded from the sample. The final sample included a group of patients with restrictive type ED (n = 49), including 32 patients diagnosed with AN-R and 17 with other specified feeding or eating disorder - atypical AN (OSFED-atypical AN, i.e., met all criteria for AN-R except low body weight). The second group included patients with binge eating/purging EDs (n = 49) and consisted of 22 patients with BN, 19 patients with AN-BP, and 8 patients with other specified feeding or eating disorder - purging disorder or atypical BN (i.e., recurrent purging to influence weight in the absence of binge eating or with binge eating but not in the frequency required for diagnosing BN).

Exclusion criteria were the presence/history of substance abuse or psychosis as these conditions may be associated with ER difficulties, irrespective of the ED. All patients completed questionnaires during their first intake in the unit after referral by their physician and prior to an interview with a psychiatrist. The sample did not include patients with a history of diagnostic crossover in their EDs. Specifically, restrictive type ED patients reported no previous binge eating or purging behaviors. Binge eating/purging ED patients never had prolonged restrictive episodes in the absence of binge eating/purging behaviors. The Institutional Helsinki Research and Ethics Review Board at Soroka Medical Center granted a waiver of consent for this retrospective medical record review study that used deidentified questionnaire data originally collected for clinical proposes.

Measures

The Difficulties in Emotion Regulation Scale (DERS)

ER abilities were assessed using the DERS, a 36-item self-report questionnaire that produces a total score of ER and a score in six subscales (Gratz and Roemer 2004). The subscales include: (1) impulse control difficulties, (2) difficulties engaging in goal-directed behavior when emotionally aroused, (3) lack of emotional awareness, (4) lack of emotional clarity, (5) nonacceptance of emotions and (6) limited access to emotion regulation strategies responses. A study assessing reliability and validity of the DERS in adolescents (N = 428) reported good to excellent internal consistencies for the DERS subscale (alphas ranged from .76 to .89). Furthermore, in support of the measure's construct validity, robust correlations were found between the DERS scores and psychological problems reflecting emotion dysregulation (Weinberg and Klonsky 2009). Internal consistency of the DERS in our study was Cronbach's alpha of 0.93.

Clinical Symptoms

Symptoms of eating disorders were assessed with the Eating Attitudes Test 26 (EAT-26; Garner et al. 1982) (Cronbach's alpha = 0.92). Depressive symptoms were measured using the Beck Depression Inventory-II (BDI-II; Beck et al. 1996) (Cronbach's alpha = 0.92), and anxiety symptoms were assessed using the Beck Anxiety Inventory (BAI; Beck et al. 1988) (Cronbach's alpha = 0.94).

Table 1 Demographic and clinical variables for patients with restrictive and binge eating/purging EDs

	Restrictive EDs (n = 49)	Binge eating/purging EDs (n = 49)	*p-value*	Cohen's d
Age (years)	16.15 (1.99)	15.9 (1.7)	.57	0.13
Illness duration (months)*	22.07 (19.96)	23.23 (17.92)	.77	0.06
BMI	17.47 (2.19)	21.99 (4.29)	< .001	1.32
%EBW	85.66 (10.95)	108.33 (22.63)	< .001	1.27
Comorbid diagnoses (%)				
Major depressive disorder / dysthymia	8	14		
Anxiety disorder	14	16		
Obsessive-compulsive disorder	14	8		
Other	16	22		
EAT-26	31.97 (18.99)	43.20 (17.01)	< .01	0.62
BDI-II	19.29 (12.44)	28.75 (12.36)	< .001	0.76
BAI	14.93 (12.24)	29.43 (14.70)	< .001	1.07
OCI-R	20.11 (13.65)	30.47 (11.73)	< .001	0.81

Standard deviations appear in parenthesis. BMI = body mass index; %EBW = % estimated body weight; EAT-26 = Eating Attitude Test 26; BDI-II = Beck Depression Inventory II; BAI = Beck Anxiety Inventory OCI-R = Obsessive Compulsive Inventory – Revised. * = Illness duration data was not available for six patients in the restrictive EDs group and four in the binge eating/purging group

Finally, obsessive-compulsive disorder symptoms were assessed using the Obsessive Compulsive Inventory – Revised (OCI-R; Foa et al. 2002) (Cronbach's alpha = 0.88). Height and weight were measured by a certified nurse and used to calculate body mass index (BMI) and percentage of expected body weight (%EBW) based on the 50th percentile for height, age, and gender from the Centers for Disease Control and Prevention.

Data analysis

Shapiro-Wilk tests were used to assess normal distributions of the measures used in the current study. The tests revealed that scores on the EAT-26, BAI, BMI and %EBW were positively skewed. Standard log transformations were conducted to normalize the data. Independent samples *t*-tests were used to compare demographic and clinical measures between participants with restrictive EDs and binge eating/purging EDs. To test the primary hypotheses, we conducted independent *t*-tests with group (binge eating/purging vs. restrictive EDs) as the independent variable and each of the six subscales of the DERS as the dependent measure. If a significant difference was found, we continued with planned analyses to explore whether the ER profile is similar or different as a function of the specific ED diagnosis within each group.

Multiple imputation was used to impute missing data on questionnaires (1.63%). The reported results are based on the pooled statistics of five separate imputations implemented using SPSS v23. Cohen's d effect size and partial eta squared are reported when appropriate (Cohen 1988).

Results

Sample characteristics and clinical variables

Table 1 presents differences between the binge eating/purging and restrictive ED groups on demographic and clinical variables. The restrictive ED group had lower BMI and %EBW compared to the binge eating/purging ED group and scored lower on all clinical questionnaires assessing ED symptomatology and comorbid symptomatology.

Group differences on the difficulties in emotion regulation scale

Table 2 represents results of the DERS subscales as a function of specific ED diagnoses and diagnostic group. As hypothesized, the binge eating/purging group reported greater difficulties in impulse control than those with restrictive EDs, $t(96) = 3.76$, $p < .001$, $d = .76$. Moreover, there were no differences between AN-R and OSFED-atypical AN, $t(47) = 0.25$, $p = .79$, $d = 0.07$, nor between BN, AN-BP and OSFED- purging/atypical BN, $F(2, 46) = 0.31$, $p = .72$, $\eta^2_p = .01$.

Similarly and in line with our hypothesis, adolescents with binge eating/purging EDs reported greater difficulty to engage in goal-directed behaviors than those with restrictive EDs, $t(96) = 4.77$, $p < .001$, $d = 0.95$. In addition, there was no difference in goal-directed behavior between adolescents with AN-R and atypical AN, $t(47) = 0.59$, $p = .55$, $d = 0.17$, nor a difference between specific binge eating/purging diagnoses $F(2, 46) = 0.26$, $p = .76$, $\eta^2_p = .01$.

Table 2 Mean scores of each subscale in the DERS as a function of specific ED diagnoses and group

	AN-R (*N* = 32)	OSFED-atypical AN (*N* = 17)	BN (*N* = 22)	AN-BP (*N* = 19)	OSFED-purging / atypical BN (*N* = 8)	Restrictive eating disorders (*N* = 49)	Binge eating/purging eating disorders (*N* = 49)
Impulse control	13.01 (5.87)	13.47 (5.06)	18.72 (7.13)	17.52 (6.14)	16.75 (6.27)	13.17 (5.95)	17.93 (6.53)
Goal-directed behavior	13.21 (4.23)	14 (4.63)	18.08 (4.89)	17.21(4.84)	18.5 (4.17)	13.49 (4.34)	17.81 (4.7)
Awareness	17.5 (4.42)	16.46 (3.84)	18.25 (4.63)	19.89 (3.72)	20.15 (3.09)	17.14 (4.22)	19.19 (4.09)
Clarity	10.65 (4.21)	11.47 (3.79)	14.72 (4.62)	14.05 (5.04)	13.87 (3.22)	10.93 (4.05)	14.32 (4.53)
Nonacceptance	13 (5.96)	14.76 (8.28)	14.2 (5.45)	16.46 (5.87)	15 (8.28)	13.61 (6.43)	15.2 (6.08)
Strategies	18.31 (8.39)	18 (6.23)	25.76 (7.65)	24 (7.9)	19.75 (5.52)	18.2 (7.64)	24.09 (7.61)
Total score	85.68 (25.62)	88.16 (24.52)	109.73 (22.04)	109.13 (26.9)	104.02 (14.43)	86.54 (25.02)	105.54 (22.77)

Standard deviations are in parenthesis. AN-R: anorexia nervosa restrictive type; OSFED-atypical AN: other specified feeding or eating disorders – atypical anorexia nervosa; BN: bulimia nervosa; AN-BP: anorexia nervosa – binging/purging type; OSFED-purging/atypical BN: other specified feeding or eating disorder – purging disorder or atypical bulimia nervosa

In contrast with our a priori hypothesis, greater difficulty in emotional awareness was found among adolescents with binge eating/purging EDs vs. restrictive EDs, $t(96) = 2.38$, $p = .01$, $d = 0.49$. There was no significant difference between specific diagnoses within the restrictive EDs group, $t(47) = 0.81$, $p = .41$, $d = 0.25$, nor between specific diagnoses within the binge eating/purging group, $F(2, 46) = 1.06$, $p = .35$, $\eta^2_p = .04$.

A similar pattern was found in the measure of clarity of emotions. In contrast with the hypothesis, adolescents with binge eating/purging EDs reported less emotional clarity than those with restrictive EDs, $t(96) = 3.84$, $p < .001$, $d = 0.78$. Here again there were no differences in emotional clarity between the ED diagnoses within the restrictive group, $t(47) = 0.66$, $p = .50$, $d = 0.20$, nor within the binge eating/purging group, $F(2, 46) = 0.15$, $p = .86$, $\eta^2_p = .006$.

In line with the hypothesis there was no difference between the groups in non-acceptance of emotion, $t(96) = 1.21$, $p = .22$, $d = 0.25$.

The results regarding availability of emotional strategies confirmed our a priori hypothesis revealing that adolescents in the binge eating/purging group reported less availability of ER strategies that are perceived effective compared to adolescents in the restrictive EDs group, $t(96) = 3.83$, $p < .001$, $d = 0.77$. Furthermore, there was no difference between AN-R and atypical AN, $t(47) = 0.13$, $p = .89$, $d = 0.04$, nor differences within the binge eating/purging EDs group, $F(2, 46) = 1.90$, $p = .16$, $\eta^2_p = .07$.

Post-hoc analyses: Addressing potential underreporting in the restrictive EDs group

When reviewing the results, it is apparent that adolescents with restrictive EDs scored lower than adolescents with binge eating/purging EDs on a variety of clinical questionnaires, including in severity of the ED. Minimization and denial of the severity of the illness is in fact a common phenomenon in adolescents with AN (Couturier and Lock 2006). In our sample, 14 adolescents with restrictive EDs scored below the clinical cutoff of the EAT-26 (< 20) compared to only 6 patients in the binge eating/purging group despite having a confirmed diagnosis of ED via clinical interview. In order to mitigate the possibility that the differences between the groups in the DERS subscales were due to symptom denial in the restrictive group, we again compared restrictive vs. binge eating/purging EDs on subscales of the DERS, excluding all patients with scores below the clinical cutoff in the EAT-26. After using this exclusion criterion, there was no difference between the groups in the EAT-26, $t(78) = 1.41$, $p = 1.59$, $d = 0.31$. In addition, the difference in BDI-II was marginally significant, $t(78) = 1.92$, $p = .055$, $d = 0.43$. There were still group differences in measures of OCD (OCI-R), $t(78) = 2.65$, $p = .008$, $d = 0.60$ and anxiety (BAI), $t(78) = 3.84$, $p < .001$, $d = 0.86$,

indicating greater severity in the binge eating/purging group. Most importantly, the additional analyses showed that even when using the exclusion criterion, the differences between the groups in ER dimensions did not change; the binge eating/purging group scored higher than the restrictive EDs group on impulse control and goal-directed behavior, $t(78) = 2.96$, $p = .003$, $d = 0.62$ and $t(78) = 3.31$, $p = .001$, $d = 0.74$, respectively. There was a marginally significant difference between the groups in emotional awareness, $t(78) = 1.68$, $p = .09$, $d = 0.38$, and a significant difference in clarity of emotion, $t(78) = 2.64$, $p = .008$, $d = 0.59$ (i.e., in both binge eating/purging patients scored higher). There was no difference between the group in nonacceptance of emotions, $t(78) = 1.19$, $p = .23$, $d = 0.26$. Furthermore, the binge eating/purging group reported less availability of ER strategies, $t(78) = 2.63$, $p = .009$, $d = 0.59$.

Post-hoc analyses: Controlling for comorbid symptoms

In order to assess the contribution of comorbid symptoms of depression, anxiety and OCD to differences between the groups on ER, we conducted regression analyses, each taking scores in the DERS (total score and each subscale that was found significant) as a dependent measure, group (binge eating/purging vs. restrictive EDs) as an independent variable and results on the BDI (i.e., depression), BAI (i.e., anxiety) and OCI-R (i.e., OCD) as covariates. For the DERS-total score, the group effect was significant ($\beta = .14$, $p = .03$). BDI was also significant ($\beta = .54$, $p < .001$) as well as OCI-R ($\beta = .21$, $p = .02$). For impulse control, the group difference was marginally significant ($\beta = .14$, $p = .06$) and BDI was the only significant covariate ($\beta = .30$, $p = .004$). For goal-directed behavior, the group effect remained significant ($\beta = .27$, $p = .005$). The BDI was also significant ($\beta = .24$, $p = .03$) as well as the OCI-R ($\beta = .26$, $p = .03$). For awareness of emotions, the group effect was no longer significant ($\beta = .13$, $p = .16$) and BDI was the only significant covariate ($\beta = .34$, $p = .008$). For clarity of emotions, the group effect was no longer significant ($\beta = .08$, $p = .25$) and BDI was the only significant covariate ($\beta = .49$, $p < .001$). For strategies of emotion regulation, the group difference was marginally significant ($\beta = .14$, $p = .06$) and the BDI and OCI-R were significant ($\beta = .59$, $p < .001$ and $\beta = .20$, $p = .03$, respectively).

Discussion

The aim of the current study was to assess various aspects of ER among adolescents with binge eating/purging vs. restrictive (i.e., no binge eating/purging behaviors) EDs. The results confirmed the following hypotheses: (1) Adolescents with binge eating/purging EDs reported greater difficulty engaging in goal-directed behavior and controlling impulses compared to adolescents with restrictive EDs. (2) Adolescents with binge eating/purging behaviors reported less availability of ER strategies that they perceive effective. (3) No difference was found between the two groups in tendency for nonacceptance of emotions. In contrast with the a priori hypothesis, adolescents with restrictive EDs did not report greater difficulty in awareness and clarity of emotions. In fact, adolescents with binge eating/purging EDs reported less emotional awareness and clarity than adolescents with restrictive EDs. However, once controlling of comorbid symptoms these differences for awareness and clarity were no longer significant.

This study is the first to investigate multiple dimensions of ER in adolescents with EDs while specifically comparing binge eating/purging EDs with restrictive EDs. In contrast with previous suggestions that ER difficulties are a transdiagnostic feature in EDs and that ED types do not differ in their ER profile (Svaldi et al. 2012), the results of the current study indicate that during adolescence, presence of binge eating or purging behaviors are associated with greater severity of ER difficulties. Furthermore, presence vs. absence of binge eating/purging behaviors seems to be more important in predicting ER difficulties than specific diagnostic criteria. For example, the two subtypes of AN, AN-R and AN-BP, share similar weight criterion but they differ in the absence vs. presence of binge/purging behaviors, respectively. However, our results suggest that these groups are substantially different in their ER profile. In fact, we found that the ER profile of adolescents with AN-BP is strikingly similar to that of BN, which includes similar symptoms as AN-BP except for the weight criterion.

The current results add knowledge to continuous debate regarding differences between types of EDs on specific ER dimensions. The results revealed that the largest differences between binge eating/purging and restrictive EDs is in measures of self-control, i.e., goal-directed behavior and impulse control, in which adolescents with binge eating/purging EDs reported greater difficulties. Previous studies did not find differences on these measures when comparing patients with AN and BN (Harrison et al. 2010; Svaldi et al. 2012). This could be due to the fact that studies on ER often include in their AN sample both patients with AN who engage in binge eating/purging behaviors (i.e., AN-BP) and patients with AN who do not engage in binge eating/purging behaviors (i.e., AN-R). Congruent with our findings, a recent study that distinguished AN-R and AN-BP did report greater impulse control difficulties in patients with AN-BP than with AN-R (Brockmeyer et al. 2014).

Given evidence of insufficient ability to control impulses and engage in goal-directed behavior, it is not surprising that patients with binge eating/purging also report not having access to effective strategies to regulate their emotions at times of emotional distress. Indeed, previous studies reported that patients with binge eating/purging behaviors do not use

adaptive emotion regulation strategies, such as cognitive reappraisal, to the same extent as patients with restrictive EDs (Danner et al. 2012). The results of the current study support these findings by demonstrating that adolescents with binge eating/purging behaviors experience having less access to ER strategies that they perceive effective.

With respect to the ability to accept emotions, the results of this research are congruent with previous studies showing no difference in nonacceptance of emotions between different types of EDs (Brockmeyer et al. 2014; Svaldi et al. 2012), suggesting that nonacceptance of emotion is a transdiagnostic feature in EDs.

Contrary to our hypotheses, we did not find that adolescents with restrictive EDs report greater difficulties in awareness and clarity of emotions. This hypothesis was based on previous studies that found greater levels of alexithymia in AN-R compared to AN-BP and BN (for review see Nowakowski et al. 2013). In the current study, we report greater difficulties in awareness and clarity of emotions in the binge eating/purging group than in the restrictive EDs group. However, these differences were not significant after controlling for comorbid psychopathology measures. No previous study examined measures of awareness and clarity of emotions in adolescents with different EDs. It could be that awareness and understanding of emotions deteriorates more rapidly in restrictive EDs as the illness progresses. However, further research is required in order examine the trajectory of ER problems in EDs.

The current study has several limitations that should be addressed. First, this study did not include patients with binge eating disorder (BED). Individuals with BED usually seek treatment at older ages than individuals with either BN or AN (American Psychiatric Association 2013). Therefore, our results cannot be generalized to all EDs that are characterized by the presence of binge eating. Moreover, our sample of patients with OSFED-atypical BN/purging disorder was not large enough to reach conclusions regarding their results. That said, the pattern of their results on ER measures was very similar to that of adolescents with AN-BP and BN. An additional limitation is the use of a self-report questionnaire to assess ER, which could be influenced by response biases. For example, minimization and denial of illness severity is more common among adolescents with EDs than adults (Couturier and Lock 2006). However, it is important to note that we conducted additional analyses that replicated the results even following exclusion of patients who can be considered potential deniers of the eating pathology as defined in previous research (Couturier and Lock 2006). Nevertheless, future studies should assess ER across types of EDs by using measures that do not require high levels of introspection or by using in-the-moment observational methods such as Ecological Momentary Assessment.

Another potential limitation is the presence of high scores on other psychopathology measures in the binge eating/purging group, which could indicate greater overall illness severity in that group. This could have an impact on the findings if the group differences in ER were due to severity of illness. However, overall ER differences remained when controlling for comorbid symptoms and when equating groups on EAT-26 scores. In addition, the duration of illness was equal between groups, suggesting that these differences in ER difficulties are not simply due to differences in overall severity of illness. Note that the group differences on ER subscales were weaker after controlling for comorbid psychopathology. However, this is to be expected considering that ER difficulties lead to depression and other psychopathology longitudinally (Hatzenbuehler et al. 2008; Silk et al. 2003). Thus, clearing the variance from ER that is not related to depression, anxiety and obsessions limits the ability to detect meaningful group differences in ER.

Despite these limitations, this study contributes to the literature being the first to our knowledge to assess ER among different types of EDs during adolescence. Adolescence is a time when ER abilities are developing. In the majority of cases, EDs onset during this critical period of time for cognitive and emotional development. In a recent review on ER in EDs, it was stressed that there is a substantial gap in the knowledge on ER in adults and adolescents with EDs (Lavender et al. 2015). One advantage in studying ER in adolescents with EDs is that due to their shorter illness durations, they are less subject to diagnostic crossovers in their EDs diagnoses. Such crossovers are common in adults with EDs (Eddy et al. 2008) and may be accompanied by unknown changes in ER that would make it difficult to understand associations between specific types of eating behaviors and specific ER problems. The current study which did not include adolescents with past diagnostic crossovers in their ED demonstrated that the presence or absence of binge eating/purging behaviors plays an important role in determining the severity of ER deficits in adolescents with EDs. Our findings suggest that during adolescence, patients with binge eating/purging behaviors are characterized by greater difficulties in ER compared to those with restrictive behaviors. Past research with adult samples did not show such a clear dissociation (Brockmeyer et al. 2014; Svaldi et al. 2012). It is also possible that ER difficulties increase rapidly in restrictive EDs as the illness progresses and by the time they reach adulthood, the differences in ER profile between types of EDs are less clear. A longitudinal study that monitors the development of ER in adolescents with EDs into adulthood is warranted in order to determine if this is the case. Such study could also assess whether ER difficulties can predict diagnostic crossovers which are common in adults with longer illness durations.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study formal consent is not required.

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